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THE CONTEST BETWEEN RURAL TELEPHONES AND THE FARMER'S FLIVVER

Telephone companies serving rural subscribers are waking up to the importance of convincing them of the essential value of farm telephone service. This would hardly seem necessary in view of what the telephone has done to make rural life more pleasant and profitable, but nevertheless it is considered advisable, for the pinch of hard times has led farmers to try to get along without service.

Many companies operating rural lines are working to save these proposed "disconnects," and at the same time showing the farm subscribers how they can extend their use of the telephone with profit to themselves—largely by employing toll service instead of using the automobile for a trip that is more expensive and requires more time than the telephone message.

In these days, when everybody is trying to cut expenses, telephone companies have a strong talking point in urging more extensive use of a service which saves both time and money.

* * * *

A letter to TELEPHONY from a telephone man of wide experience says: "I hope you get into a complete and profitable discussion of the 'contest' between telephone communication and unnecessary 'flivver' transportation.

"This may be a somewhat delicate subject, as under present ideas of business ethics it is not considered good form to indulge in comparative advertising. I recall that one tobacco company was induced to change its slogan boosting a certain brand of cigarettes because it reflected injuriously on the candy business. However, the change did not come until the head of the concern earned in salary and bonus for increased sales more than a million dollars.

* * * *

"While we need not resort to an advertising campaign declaring war on the 'flivver,' it is necessary for the rural exchange manager to be able to set his patrons right and get them to do some real thinking on this important matter. A large portion of the farm surpluses now glutting the market—and keeping prices down—was formerly consumed by the horses on the farm and the numerous horses kept by town and city residents.

In addition to losing his grain and hay market in town to the oil industry, the farmer himself is trying to see how much gas and oil he can consume on the farm, not only in his tractor but also in his pleasure car.

While the farmer cannot be criticized for owning a modest automobile for necessary business trips, the fact remains that he will better his own condition by using his telephone as much as possible and his 'flivver' only when it can serve him and the telephone can't. In short, the farmer should become a user of long distance outside the limits of his free service area in order to cut down the cost of automobile transportation."

The same idea was emphasized by H. N. Faris in an article published in TELEPHONY last month which advanced the sound argument that the farmer—or anybody else—who wished to save money should use the telephone at a cost of $1.50 a month instead of using the car at a cost of $1.50 an hour, plus driving time.

Mr. Faris avoided the appearance of a possible unfair discrimination against the automobile fraternity by making this point:

"As unnecessary driving brings no real or lasting benefit to the car dealer, the tire man or the filling station, no apologies are necessary for calling attention to this evil for defensive rather than offensive purposes. By the liberal use of telephone service futile trips can be avoided and car mileage reduced enough to more than pay the (telephone) bill, not to mention the saving in time and human wear-and-tear which is even more important."

* * * *

The Minnesota Telephone Association has compiled a booklet for its member companies to distribute among their rural subscribers which describes many ways to make the telephone more useful. This work was done in response to a demand by the companies which felt the need of counteracting the wave of economy which sometimes has led farmers thoughtlessly to plan to cut expenses by getting along without the service. The companies that have met such conditions aggressively are able to prove the unwisdom of such a course and have retained their subscribers.

Some companies also are sending the booklet to former patrons who have cancelled the service within the last two years, with the idea of securing a reinstallation. There are so many ways in which the farm telephone can pay its keep and show a profit that in most cases all that is needed is a reminder.

* * * *

The closing paragraph in the Minnesota booklet is significant. Its title is "Lubricating Oil or Telephone," and it says:

"The cost of oil for lubricating your automobile is only a small part of your automobile expense. And yet your telephone costs you less money than the oil for your automobile. At its cost of a few cents a day, it is actually less per month than the cheapest thing in your automobile —the oil—if you are an average driver.

Your telephone at this exceedingly small cost saves you many expensive trips. It keeps you in constant touch with your friends. It takes you instantly to your commission merchants and others with whom you deal. It may be the means of saving a life when you need a doctor, and it will bring you help in case of fire or accident. You can't afford to be without a telephone.

The cost of this ever-ready servant is down so low that today telephone service is the cheapest thing in the world—and yet the most valuable. Use your telephone more often."

Living Costs Down.

According to figures compiled by the National Industrial Conference Board, the living costs of the average American wage earner are now lower than at any time in the last 12 years. This is not particularly startling news, but it should be interesting to public service companies for two reasons. One is that it shows that while the wage earner may be working only part time, or possibly on a reduced scale of pay, he is still able to buy the utility service which contributes to the comfort of his family, as his total living bills are less than in 1928, 1929 and 1930.

The other reason in mind is that, with other commodity prices down, it behooves utility companies—including telephone companies—to keep their service on a high grade, and be able to answer effectively the argument, for instance, that telephone rates should come down because the tangible supplies like meat, grain and oil are off in price.

* * * *

The cost of living in 1930 was 3.8 per cent lower than in 1929, as shown by the statistics of the National Industrial Conference Board, and 4.2 per cent lower than in 1928. At the close of 1930 the index was at the lowest point since June, 1918. April, 1931, showed the downward trend still apparent, being 4.8 per cent lower than in December, 1930, and nearly 12 per cent lower than in 1923.

The economists say the largest declines have been recorded in food and clothing prices, which mean most to the average family. Rent, fuel and light show less change than the other major items just mentioned.

In brief, the purchasing power of the dollar at the end of 1930 was 108 cents as compared to 100 cents back in 1923. All service companies looking for new business should bear these facts in mind, as they indicate that the average household may actually be better off than the depression press agents have described in vivid terms.

Eavesdropping Problem on Rural Lines

Interesting Discussion of Eavesdropping on Rural Lines From an Engineering Viewpoint—Suggestion for Reducing Eavesdropping Through Use of Low Loss Transmission Circuit With Discussion of Advantages—Another Arrangement

By B. C. Burden,

Transmission Engineer, Lincoln Telephone & Telegraph Co., Lincoln, Neb.

Transmission loss due to eavesdropping on rural multi-party lines has long been a problem in connection with the giving of good rural service.

A review of this problem will show that it is as unsolved today as it was 20 years ago. This may be due either to neglect or to the insurmountable difficulties of the problem itself. The fact remains that the multi-party rural line bridging telephone in use today is the exact counterpact of the one on which General John J. Carty, years ago, took out patent No. 449,106.

It has been the writer's experience that those not familiar with the real facts concerning the transmission loss due to eavesdropping have but little appreciation of its magnitude. The illustration (Fig. 1) shows the effect on a rural line conversation of a variable number of eavesdroppers. A careful inspection of the facts presented in this illustration should convince anyone of the seriousness of the eavesdropping loss on rural party lines.

It is assumed by some that the effect of this loss is responsible, in part at least, for the small amount of toll business obtained from the average rural subscriber, for regardless of how carefully toll circuits may be designed, they are useless to the farmer if several of his neighbors "tune in" on a toll call.

Early-Day Party Line Selective Systems.

Before discussing a proposed scheme that appears to offer at least a partial solution toward reducing eavesdropping loss, let us consider some of the early schemes which were used in attempts to give selective service on multi-party lines.

One of the earliest selective systems was that invented by Dickerson in 1879. This system consisted of two disks located in each telephone and arranged to be rotated by an impulse magnet on current sent out from the central office. Segments on these disks would connect the bell and talking circuit of the called telephone when rotated to the proper point by the current impulses sent out by the operator, all other telephones being "locked out."

The disadvantages of such a system lay in its mechanical complexity as well as certain operating difficulties.

Another system which followed this was one brought out by Anders. It consisted of a mechanism to lock the tapper of all bells except the one being called. The "Baird Lockout System" was still another of the early attempts to give selective service on party lines.

All of these systems were finally dropped, because of their high maintenance costs, operating difficulties and in some cases the fact that the subscribers found means of defeating the "lockout" principle upon which most of them were based.

The invention of the tuned reed ringer, however, made possible a practical system of selective signaling which was an improvement over all previous efforts along this line when more than four telephones were to be selectively signaled. Of late years selective signaling on multi-party rural lines by means of tuned reed ringers is becoming quite popular, especially in

connection with common battery dial lines.

Summarizing these efforts for eliminating the high transmission loss caused by eavesdropping, we can say that up to the present time the only accomplishment that might be considered as being of any benefit is the tuned reed selective ringing system. The system, while being a step in the right direction, has several limitations which prevent it from being a complete answer to the problem. These limitations are:

1. Tuned ringers will often give an audible hum when another subscriber is being signaled. This hum invites the eavesdropping subscriber to "tune in."

2. Subscribers of the eavesdropping type will listen-in periodically until they catch someone talking.

3. Subscribers attempting to make a call and finding the line in use will eavesdrop to the completion of the call that is in progress.

The previous paragraphs have discussed the magnitude of the eavesdropping loss and means for preventing the subscriber "listening-in" but nothing has been said about the subscribers' rights and desires in the matter. Let us next look at the psychological and ethical side of the eavesdropping problem.

Psychological and Ethical Factors

Most telephone executives argue that eavesdropping on a party line is in the same category as peeking through the keyhole or opening the mail of someone else.

A few are inclined to take a more liberal view. They differentiate between the rural and city party line, contending that the typical multi-party line in a rural area, having a well-defined community interest, must be treated as a special case, and the fact recognized that the subscribers on such lines are entitled to eavesdrop if they so desire.

This reasoning takes into account the fact that it is universally understood by

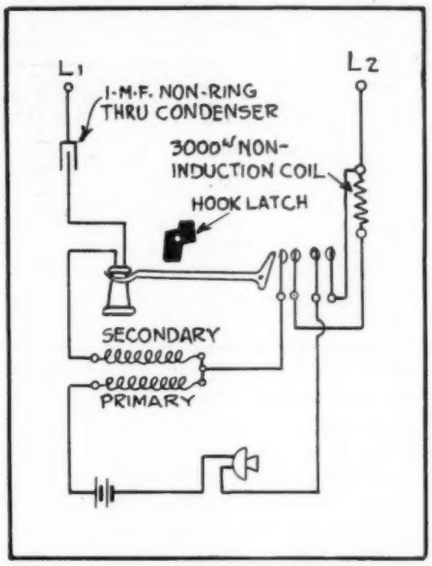


Fig. 2. Low-Loss Eavesdropping Arrangement.

telephone users that party-line service is not private and that, like the postcard, should not carry messages of a private nature. It further recognizes that many rural line subscribers retain their telephone mainly because of the companionship it gives them by listening to other people's conversations. This view while wrong in theory possibly, nevertheless is one which results in enhancing the attractiveness of a telephone to the average rural subscriber.

Stating this thought somewhat differently, it is the writer's belief that the subscriber on a multi-party rural line is less liable to remove his telephone during periods of depression than is the subscriber on a party line so arranged as to make eavesdropping impossible or uncertain.

It would seem that there are three ways of looking at the eavesdropping problem:

1. That eavesdropping is unethical and harmful to the service and should be discouraged in every way possible by the telephone company, but that devices intended to reduce the harmful effects and still permit eavesdropping should not be used.

2. That eavesdropping is not unethical on a rural party line, but that some means should be taken to reduce the excessive transmission loss which such practice engenders.

3. That eavesdropping is unethical but that the seriousness of the transmission loss from such practice warrants the use of any practical means which will reduce the loss, even though the device may appear to the subscriber as an invitation to listen.

The writer believes that of the three views No. 3 is the most reasonable and proposes an arrangement for reducing the loss caused by eavesdropping without preventing the eavesdropper from satisfactorily overhearing the line conversations.

Low-Loss Eavesdropping Circuit.

The proposed low-loss eavesdropping circuit is based on the assumption that an eavesdropping subscriber will be satisfied with less volume when eavesdropping than when making a regular call. If this assumption is correct, then advantage can be taken of it by equipping each subscriber's telephone with a device which under control of a "receiver hook latch" reduces the bridged loss of an eavesdropper's set by increasing its impedance under the eavesdropping condition.

The proposed circuit is shown in Fig. 2. It will be noted that the only difference between this circuit and a regular local battery circuit is the addition of a special hook switch and latch and a 3,000-ohm resistance coil. The circuit is arranged so that the coil is in series with the receiver, and the primary is open when the hook latch is in the eavesdropping position. In the talking position the coil is short-circuited and the primary circuit closed.

The effect of the 3,000-ohm coil on the eavesdropping subscriber's telephone circuit is to cause approximately a 10 db. receiving loss; that is, the receiving loss in the eavesdropper's telephone is increased 10 db.

At first thought this might seem like an excessive loss which would be sufficient to cause the eavesdropper to trip the hook switch in order to hear better. Actual tests, however, indicate that the eavesdropper *can hear satisfactorily* on the average call and would be satisfied to listen without tripping the hook latch.

There are three reasons which would appear to justify the conclusion that the eavesdropper would be satisfied with less volume than he would obtain by tripping the hook latch:

1. It is physically easier for him to hear line conversations because of the absence of side tone from his own transmitter, for under the eavesdropping connection his own transmitter is not in circuit.

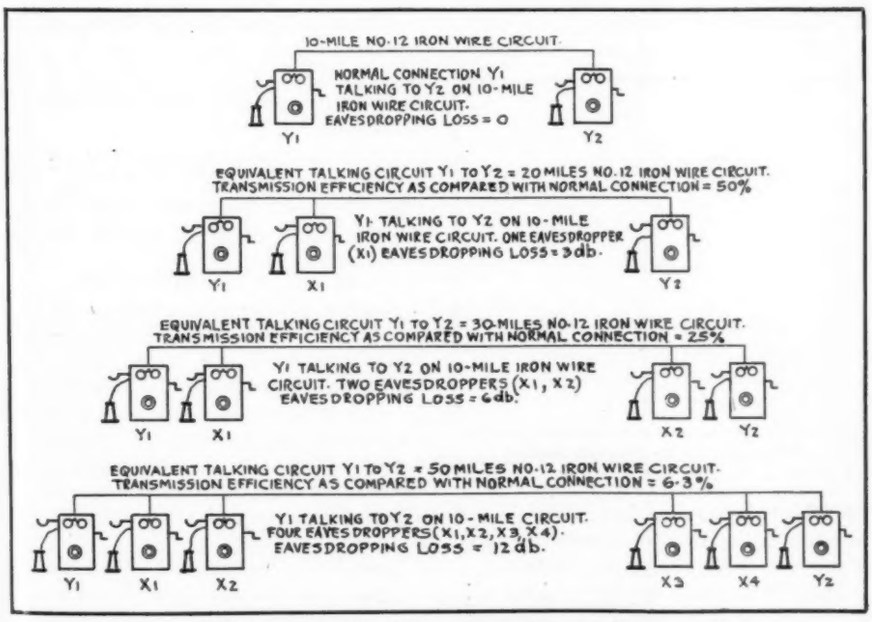

10-MILE NO.12 IRON WIRE CIRCUIT.
NORMAL CONNECTION Y1 TALKING TO Y2 ON 10-MILE IRON WIRE CIRCUIT. EAVESDROPPING LOSS = 0
Y1
Y2
EQUIVALENT TALKING CIRCUIT Y1 TO Y2 = 20 MILES NO.12 IRON WIRE CIRCUIT. TRANSMISSION EFFICIENCY AS COMPARED WITH NORMAL CONNECTION = 50%
Y1 TALKING TO Y2 ON 10-MILE IRON WIRE CIRCUIT. ONE EAVESDROPPER (X1) EAVESDROPPING LOSS = 3db.
Y1
X1
Y2
EQUIVALENT TALKING CIRCUIT Y1 TO Y2 = 30 MILES NO.12 IRON WIRE CIRCUIT. TRANSMISSION EFFICIENCY AS COMPARED WITH NORMAL CONNECTION = 25%
Y1 TALKING TO Y2 ON 10-MILE IRON WIRE CIRCUIT. TWO EAVESDROPPERS (X1, X2) EAVESDROPPING LOSS = 6db.
Y1
X1
X2
Y2
EQUIVALENT TALKING CIRCUIT Y1 TO Y2 = 50 MILES NO.12 IRON WIRE CIRCUIT. TRANSMISSION EFFICIENCY AS COMPARED WITH NORMAL CONNECTION = 6.3%
Y1 TALKING TO Y2 ON 10-MILE CIRCUIT. FOUR EAVESDROPPERS (X1, X2, X3, X4). EAVESDROPPING LOSS = 12 db.
Y1
X1
X2
X3
X4
Y2

Fig. 1. Effect of Eavesdropping on Rural Local Battery Lines.

2. He is satisfied with less volume as he is instructed by the telephone company that tripping the hook latch will greatly interfere with a call which may be in progress.

3. He will prefer to listen with the hook latch in the eavesdropping position as this prevents room noises, which might identify the eavesdropper, from getting out on the line.

The reduction in transmission loss which the low-loss eavesdropping circuit makes possible will depend on the exact location of the various subscribers' sets on a line. Tests made on an artificial eight-party line connected to an eight-party line with various eavesdropping conditions (Fig. 3) gave the results shown in Table No. 1. These may be considered as representative of what may be expected from lines equipped with hook latches and low-loss arrangements.

Care was taken to make the tests simulate the average rural line as nearly as possible. It should be noted that those tests were made with 2,500-ohm coils, and that slightly better results would be obtained with 3,000-ohm coils. It will be seen that substantial transmission loss reduction is obtained. It is also interesting to note that the transmission gain, assuming two eavesdroppers on each line, is far greater than would be obtained by the replacement of the No. 12 iron line wire with No. 12 copper.

No trials of the low-loss eavesdropping arrangement have yet been made, but plans are under way to make extensive field trials. However, there is no reason to suspect that actual results will differ materially from those obtained under artificial line conditions.

It is the opinion of several engineers who have carefully considered the idea, that the one disadvantage of the proposed arrangement is the fact that it may appear to the subscriber that the telephone company is placing its official OK on eavesdropping when it equips telephones with hook latches designed to reduce eavesdropping loss.

This disadvantage can be overcome by explaining to each subscriber at the time a line is equipped with hook latches and coils, that the hook latch is provided so that a subscriber may listen-in prior to making a call without interfering with the service if a call is in progress. It is the writer's contention that the low-loss eavesdropping circuit offers a real remedy for improving rural line transmission and that its advantages far outweigh its disadvantages.

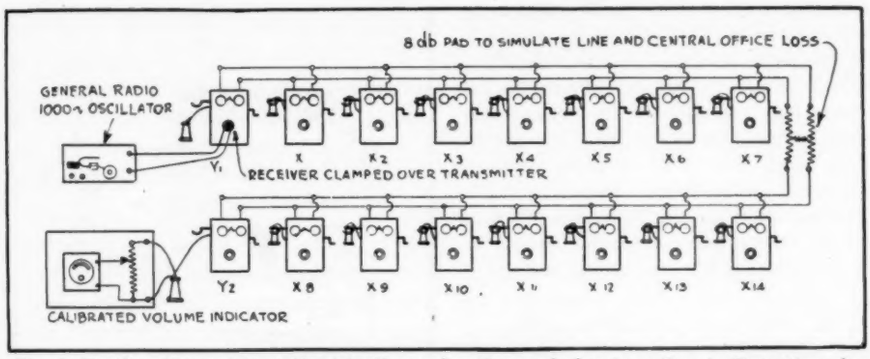


Fig. 3. Testing Arrangement Used in Measuring Transmission Loss Due to Eavesdropping.

The cost of equipping telephones should not exceed $1.50 per telephone in the small exchange, and the saving in battery current consumption due to the hook switch will ordinarily amortize this investment in a few years. Telephones could be equipped and converted to this arrangement without being removed from service. A program to ultimately convert all rural lines to this arrangement should be based on equipping the longest and heaviest loaded lines first.

The writer would be glad to correspond with anyone having questions or ideas on this same subject.

For those interested in the theoretical considerations involved in the eavesdropping problem, the following notes may be of interest.

Theoretical Considerations.

The impedance at voice frequencies of a local or common battery telephone with the receiver on the hook is quite high and is represented by the ringer coils which are bridged across the line. Because of their high impedance these coils do not introduce an appreciable transmission loss in the line to which they are bridged.

While their direct current resistance is only 1,000 to 1,600 ohms, the impedance which they offer to 1,000-cycle voice currents is approximately 30,000 ohms. The transmission loss caused by each bridged ringer on a multi-party line will average about 0.1 db.

The impedance, however, of a local or common battery telephone with the receiver off the hook is fairly low and is designed to be of such value that it will take the maximum amount of power possible from the line to which it is connected. The impedance at 1,000 cycles of a typical local battery set with the receiver off the hook is approximately 650 ohms, and that of the common battery set is 500 ohms.

In view of the fact that the characteristic impedance of the average telephone line is around 600 ohms, it is apparent that each bridged eavesdropping set will introduce a loss of about 3 db. This is shown in Fig. 4 by simple mathematical equations.

It should be appreciated that the equations given treat the impedance of line and telephones as pure resistances which is not the true condition. The results given by the equations check very closely with actual measured losses, so the errors introduced by the assumption that the line and sets are pure resistances are, therefore, not large.

It will be noted that the impedance of line and normal subscriber sets is taken as 600 ohms, while the impedance of the special set in the eavesdropping position is approximately 3,300 ohms.

The output of the transmitter of the talking set is assumed to be 1.0 volt. All comparisons are made with respect to the current in the listening receiver with a normal connection.

Special Induction Coil Set.

Another arrangement which would appear to have considerable merit and which would accomplish the same end as the resistance-coil method is illustrated in Fig 5. This arrangement operates in a similar manner to the resistance-coil method in that it utilizes a hook latch which opens the primary when the hook is in the eavesdropping position and closes it when the hook latch is tripped.

Instead of utilizing a coil to increase the impedance of the secondary circuit a special closed-core induction coil could be

Eavesdropping Condition with Y_1 Talking to Y_2	Loss in dbs. as Compared to No Eavesdropping Condition With	
Stations Eavesdropping	Special Coil	Without Coil
X_1	0.7	3.0
X_1 X_2	1.2	5.0
X_1 X_2 X_3	2.0	7.0
X_1 X_2 X_3 X_4	2.9	8.0
X_1 X_2 X_3 X_4 X_5	3.4	9.0
X_1 X_2 X_3 X_4 X_5 X_6	4.0	10.0
X_1 X_2 X_3 X_4 X_5 X_6 X_7	4.3	11.2
X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8	4.8	12.2
X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10}	5.8	14.0
All sets down (14 sets)	7.2	17.2

Table No. 1. Results of Transmission Loss Measurements Due to Eavesdropping, Made as Shown in Fig. 3.

used having a much lower leakage flux than the present open-core induction coils. Such a coil could be so designed that the impedance would be approximately 3,000 ohms when the primary circuit is open and approximately 600 ohms when it is closed.

Present types of induction coils, because of their open-core construction, do not act as true transformers. Hence, the impedance of the secondary circuit is very little affected by opening or closing the primary circuit. For this reason sets equipped with hook latches, or "battery savers" as they are sometimes called, offer only a slight transmission improvement unless equipped with special resistance coils as proposed.

The advantage of the special induction-coil method of reducing transmission loss caused by eavesdropping would be the fact that the standard three-spring hook switch could be used, thus eliminating the necessity for changing the type of hook switch on existing telephones which it might be desired to change to the "low-loss eavesdropping method."

Great Britain Plans Investigation of Cable Communications.

A searching investigation into the affairs of the Imperial & International Communications Co., Ltd., the $150,000,000 concern operating virtually the whole radio and cable systems throughout the British Empire, is to be made by an independent committee, it was announced in London on July 29. This, it is stated, should reassure shareholders throughout the world in the holding company, Cables & Wireless, Ltd., because the heavy loss of revenue as a result chiefly of the trade depression has given rise to considerable anxiety.

The net revenue of the Imperial & International Communications Co. for 1930 fell short of the standard revenue of $9,325,000 by more than $5,000,000.

The investigation committee, consisting of Wilfrid Greene, K. C., distinguished leader of the Chancery Court, as chairman; Lord Ashfield, head of London's transport group, and Lawrence Durning Holt, shipping magnate, has been appointed at the behest of the Imperial Communications advisory committee, on which the governments of Britain, Canada, Australia, New Zealand, South Africa, the Irish Free State and India are represented.

Five Thousand Graduate from First Aid and Health Courses.

More than 5,000 employes of the New York Telephone Co. were graduated from the company's first aid and health courses during the past year, and certificates have been awarded to the graduates by the American Red Cross and the telephone company, in recognition of their successful completion of the courses and their demonstrated ability to aid persons who are injured.

Since the company, in cooperation with the Red Cross, inaugurated first-aid training on a large scale about 10 years ago approximately 40,000 employes have been graduated from the courses. According to the records, these men and women have treated thousands of injured persons and have saved many lives. These graduates, most of whom are still in the employ of the organization, represent the various departments of the company, and include about an equal number of male and female employes.

This year's group of graduates, however, one of the largest since the introduction of the courses, includes slightly more men than women, there being 2,700 men, compared with about 2,600 women. Attendance at the classes is on a purely voluntary basis, the instruction taking place after the employes' regular working hours.

The instruction is given by a group of several hundred fellow employes who have been specially trained for this work. Interest in the first-aid and health courses has continued to grow, officials state.

More than 80 per cent of the nearly 17,000 men engaged in plant work throughout the state have finished the first-aid course and received certificates. The operators constitute the largest group of women employes trained in first aid. In their health classes the women not only learn the essentials of first aid but also other important phases of physical education, as useful to them in their home life as in their business.

Most of the classes are held during the period from October to May each year, although some work is done during the balance of the year—including the summer vacation season. Each class receives about 18 hours of instruction in the various phases of first aid. These include the administration of artificial respiration, where the person's breathing has been suspended due to submersion, gas asphyxiation, or electric shock, and the treatment of persons suffering from poisoning, cuts, fractures and the like.

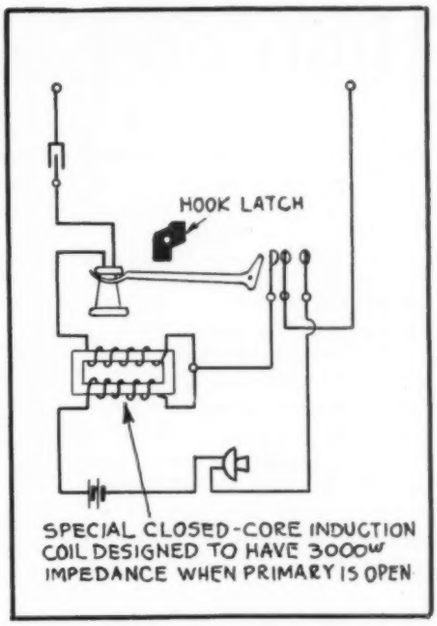


Fig. 5. Special Induction Coil Set to Reduce Eavesdropping Loss.

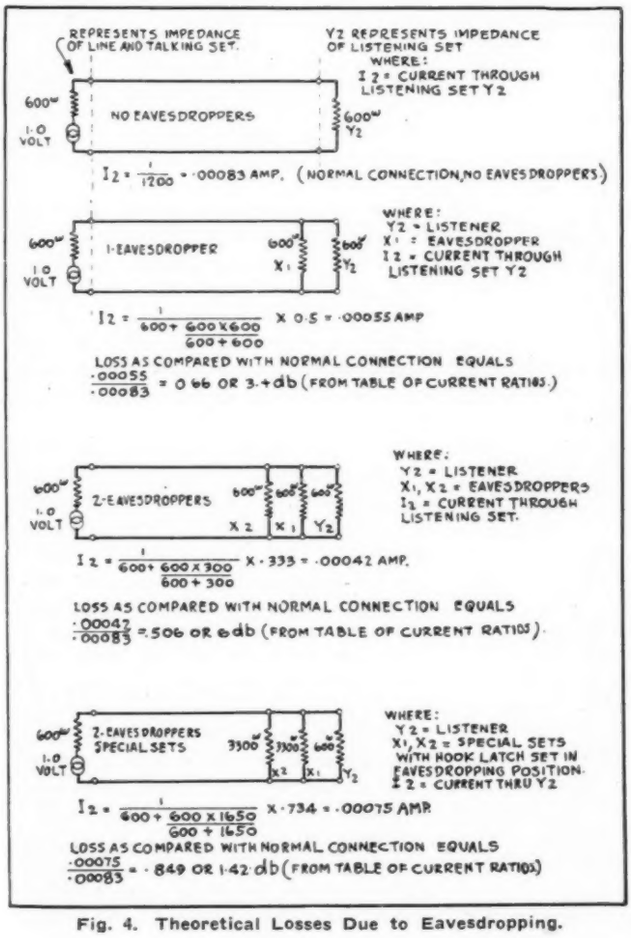

REPRESENTS IMPEDANCE OF LINE AND TALKING SET.
Y2 REPRESENTS IMPEDANCE OF LISTENING SET
WHERE:
I 2 = CURRENT THROUGH LISTENING SET Y2
600W
1.0 VOLT
NO EAVESDROPPERS
600W Y2
I2 = 1/1200 = .00083 AMP. (NORMAL CONNECTION, NO EAVESDROPPERS)
1-EAVESDROPPER
600W X1
600W Y2
WHERE:
Y2 = LISTENER
X1 = EAVESDROPPER
I 2 = CURRENT THROUGH LISTENING SET Y2
I2 = 1/600 + 600 x 600/600 + 600 X 0.5 = .00055 AMP
LOSS AS COMPARED WITH NORMAL CONNECTION EQUALS
.00055/.00083 = 0.66 OR 3.4 db (FROM TABLE OF CURRENT RATIOS.)
2-EAVESDROPPERS
X2 X1 Y2
WHERE:
Y2 = LISTENER
X1, X2 = EAVESDROPPERS
I2 = CURRENT THROUGH LISTENING SET.
I 2 = 1/600 + 600 x 300/600 + 300 X .333 = .00042 AMP.
LOSS AS COMPARED WITH NORMAL CONNECTION EQUALS
.00042/.00083 = .506 OR 6 db (FROM TABLE OF CURRENT RATIOS)
2-EAVESDROPPERS SPECIAL SETS
3300W
X2 X1 Y2
WHERE:
Y2 = LISTENER
X1, X2 = SPECIAL SETS WITH HOOK LATCH SET IN EAVESDROPPING POSITION.
I 2 = CURRENT THRU Y2
I2 = 1/600 + 600 x 1650/600 + 1650 X .734 = .00075 AMP
LOSS AS COMPARED WITH NORMAL CONNECTION EQUALS
.00075/.00083 = .849 OR 1.42 db (FROM TABLE OF CURRENT RATIOS)

Fig. 4. Theoretical Losses Due to Eavesdropping.

Proper Use of Telephone Now Studied in Iowa High School.

In order to fit them better for business positions after the completion of their school work, commercial students of the Muscatine, Iowa, high school now receive practical instruction in the proper use of the telephone.

This was brought about through the request of a Muscatine business man.

Hints on Keeping Our House in Order

Housekeeping in Small Office Should Create Good Impression Upon Public; Reports, Letters and Records Should be Filed Carefully so Subscriber May be Given Information Promptly—Paper Presented at Indiana Convention

By Miss Cecelia B. Johnson,

Supervisor of Operating Methods, Commonwealth Telephone Co., Madison, Wis.

Webster's meaning of a house is a "home." But eight hours out of every 24 the place wherein we work is virtually our home. We spend more time in our offices than we do in our homes, because our combined waking hours, from the time we leave the office until we retire, and from the time we arise in the morning until we leave for the office again are not, as a rule, equivalent to the eight hours spent in the office.

We aim to keep our homes clean and orderly, with a place for everything and everything in its place, first, because it makes living in the home more pleasant; and, second, because we wish to create a good impression upon visitors and friends.

Then, since we have a pride in having our surroundings or environment speak well of us, what about the impression we create when our business surroundings are untidy? For example, in the small office where the chief operator is also the cashier she should be careful that her office housekeeping is such as to create a favorable impression upon customers coming in.

In many offices the switchboard is exposed to the view of the customer. Cleanliness and order, both on the switchboard and in the room, are of paramount importance. Foreign directories not needed should not be kept on the switchboard. Obsolete operating practices and routing instructions should also be destroyed.

Our visiting customers are, for the most part, women. They, as a rule, take in all the details of poor housekeeping on our part. Hence it behooves us to keep our offices as we endeavor to keep our homes —above criticism.

If in paying her account, the customer finds that she has forgotten her statement, be certain that your stubs are in order so the amount can readily be obtained. Also if the customer wishes further information regarding the toll calls, be in a position to quickly secure the tickets for her inspection. It increases her confidence in you if your records are in order. If she asks for writing material or blank checks, have them at hand. Remember that in every subscriber contact your own efficiency and business ability is being judged, as well as that of the company you represent.

Let us just picture a well-regulated, clean, orderly office of the size I have just mentioned. The chief operator's desk is clear of all papers except those she is actually working on. As soon as she has no further need of the records on her desk, she returns them to their proper places. The tickets covering the last month's calls are in a drawer or file reserved for them, in their proper numerical order. Her subscribers' stubs are likewise in a suitable place in their proper numerical order.

Very few books are to be seen on the switchboard. The chief operator feels that just because a directory is sent to the exchange is not sufficient reason for using it. They limit directory work to only those points to which they build up their own circuits and directory work is actually required. All instructions and supplements are filed as soon as received and not placed haphazardly between the leaves of the books. Obsolete instructions are not retained.

Do You Study? Why Not?

There is no business, no avocation, whatever, which will not permit a man, who has the inclination, to give a little time, every day, to study.—Daniel Wyttenbach.

The operator confines business hours to business and if she has any idle time during the day she utilizes it by studying the operating instructions. The daybed is neatly made up and wraps are hung in a locker or closet. Old wraps, rubbers, umbrellas, smocks, hats and various other items of wearing apparel are not in evidence in the office. There are no obsolete records lying about because as soon as they are no longer needed they are neatly wrapped in paper, labeled and stored away out of sight until the proper time comes to destroy them.

When a customer comes into this office, if she has forgotten her bill or wishes toll tickets looked up, it is a matter of a few seconds to get the information desired. Writing material and blank checks on all banks are in a convenient place for the customer to use. The customer leaves the office feeling that she has just visited a real business office, operated in a business-like manner.

In the larger exchanges the commercial and traffic departments are operated separately. The customer does not come in contact with the operating employes except when a special visit is made to the operating room.

Our house should be in order for our own benefit also. Desks should not be littered with work or switchboards made to look untidy with books, papers and switchboard notices thereon.

Toll boards should be equipped with ticket and spiral clips and hooks should be provided for tiger clips. Directories should be provided for only those points where directory work is required and authorized and all records should be neatly and systematically filed in a desk or cabinet. On local, A-B toll, and message rate tickets should be kept in the places designated and not strewn over the key-shelf.

A systematic method of filing all reports, letters and records should be adopted. There is no particular method that is best, the system best suited to your own needs being the one to choose, but a choice of some system is essential.

Installing a filing system should entail no great expense. Manilla binders, properly labeled, will serve the purpose well; and where it is necessary to fasten the material in the binder, Acco fasteners have been found to be the most efficient. If you have any great number of letters and your filing is by subject, a ready-reference card file should be kept so that you may be in position to locate any material that is requested.

You will admit that it is most embarrassing to have your superior ask for correspondence or reports from the files and have difficulty in locating what is asked for, and possibly not find it at all or too late to be of any service. His reaction will, naturally, be that your house is badly in need of a thorough housecleaning or at least a little tidying up.

Operators' quarters should be as clean and neat as your own home. It is the place to which you go to rest and it is far more pleasant and easier to relax in clean surroundings than it is in untidy and ill-kept quarters. It is your duty to do your share in keeping old papers and magazines disposed of when no longer used. Personal belongings should be kept out of the rest-room and when furniture is moved, curtains pushed aside, Victrola records removed from the cabinet or magazines taken from the rack, the person causing the disorder should leave the room presentable for the others.

When kitchenette facilities are provided without matron service, dishes, silver and cooking utensils should be washed and replaced in the cupboards and the kitchenette left in good condition.

In the washroom paper towels should be placed in the containers provided and not strewn about the floor, and personal belongings should not be left in this room. Janitors are usually provided in offices large enough to have quarters of this type for the operating forces, and it is part of their job to keep these quarters clean. However, it is the responsibility of every individual using the quarters to do her share toward keeping them tidy and presentable at all times.

In the lockers provided in most offices each employe is assigned her own individual compartment. Only personal articles being used should be kept in the locker, and belongings not in immediate need should be taken home or otherwise disposed of.

It is not amiss to mention, also, that an employe dressed in a manner suitable for business is the desirable employe. By this I do not mean that an employe need be expensively dressed. She should wear the type of dress that is easiest to keep clean and most comfortable to work in. The consciousness that you are suitably dressed will give you a sort of self-confidence and will tend to cause you to look upon your work with greater seriousness.

I spoke of the effect untidy quarters have upon the customers, but the effect is more far-reaching than that. It affects ourselves in our daily work and it very often affects our chances for promotion. A well-kept operating room, swept and dusted daily, with everything kept in an orderly manner is conducive to an orderly, courteous, businesslike job. And as the old saying goes, "Cleanliness is next to Godliness."

Teaching Toll Operating in the Small Centers.

In the article published in TELEPHONY of July 25, entitled "Teaching Toll in the Small Center," by Miss Anna Hammen of Savanna, Ill., it will be noted that the toll tickets used as illustrations do not conform with the new instructions on long distance operating.

This is due to the fact that the article was written before the instructions became effective but its publication was held up due to lack of space. Chief operators and other traffic people familiar with the new practices noted the discrepancies between the new and the old practices, and have made the necessary corrections to conform with the new toll operating practices.

Success Reported on Adoption of New Toll Practices.

R. S. Brewster, traffic superintendent of the Lincoln (Neb.) Telephone & Telegraph Co., Lincoln, reports excellent results following the adoption all over the company's territory 2½ months ago of a new toll operating practice, one of the outstanding features of which is the overlap recording method. Mr. Brewster says that it is just another way of whittling time from long distance calls. Seven years ago it required an average of eight minutes to complete a long distance call in company territory. Today it takes just 1½ minutes.

The new method is one of simplification. To make a call under it the subscriber calls or dials long distance and gives her the following information: The name of the called city or town; the number of the telephone desired at that place, and the telephone number of the calling party. The latter holds the line and an instant later hears the name of the called exchange to which the number called is given.

While the operator is waiting for the latter to answer she asks: "What is your number, please?" and the subscriber replies. This is called overlap operations, doing two or more things at one time. The called and calling number are both recorded while waiting for the call to be completed.

The time saved is not very important to the subscriber, says Mr. Brewster, but the thing that counts most with him is the swiftness and smoothness with which the calls are handled and go through. Other new methods of adding speed and smoothness to the service have been devised.

On person-to-person calls it often happens that the called party is temporarily absent from his office or home, and word is left for him to call. In order to speed up the response he is asked to call directly the out-of-town operator, whose number is left for him to call. This often permits him to get the reverse connection without having to leave the telephone.

Operating practices have been revised to eliminate the abruptness of replies. Instead of "no available circuits," the operator replies: "The circuits are busy. I will keep trying to get one and call you." Instead of "Don't Answer," the operator now replies: "I am sorry, they do not answer. I will call you in about ten minutes."

Mr. Brewster says these are merely refinements to make the service more pleasing and satisfactory, the object first being to complete the call as soon as possible, and if not, to do everything possible later to perform the desired service satisfactorily.

What Operators Want to Know

Concentration Is Conducive to Success in Telephone Work—Try Your Powers on Concentration on Questions Propounded in This Seventh Installment; How Many Can You Answer?

By Mrs. Mayme Workman,

Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

How often do we hear the query asked in questino No. 2—why do operators ring so long? And why do they? I think the answer is lack of concentration.

Have you ever watched a quadrumanous mammal or monkey jump from his swing to the bars of his cage, then drop to the floor of that iron inclosure and pick up a peanut, and after munching for three seconds, chatter, leer, and scrutinize his outside admirers? He will lend a friendly hand to a fellow monkey that is irritated, then hop back to that horizontal performing bar and start his antics all over again. He cannot concentrate.

There is nothing else that we can do while we are ringing on a line or a toll circuit, so let us concentrate and ring at the proper interval, two seconds. While you are ringing you may say, "one thousand and two thousand," and you will be sure to ring a full two-second ring.

Some of our operating practices may seem like little things but, after all, our work like our life is made up of little things. By watching these little things we save much time and trouble.

If you are having any difficulty due to another office not conforming with the standard operating methods, do not sit and growl about it. That will not relieve the situation. Refer the condition to your supervisor or chief operator so that she may take the necessary action to have the matter adjusted. By reporting the condition, you will be helping the operator in the distant office; and you will also be making your work more pleasant.

Concentrate on your work, watch the little things and lend a helping hand to your fellow workers when the occasion arises, and I am sure you will find at the end of the day the satisfaction of a task well performed. Now, try concentrating on the five following questions:

Questions from Illinois Operators.

1. Is "room telephone da" a chargeable report and what is the subsequent attempt time?
2. Why do operators ring so long?
3. What is the correct phrase to use in passing a collect call?
4. When the toll operator tells you to hold the trunk and the calling number, should you stay on the line or have the toll operator ring you again?
5. Do you still encircle your number when you give CLR service on a call?

For answers to these questions from real telephone operators, turn to page 38.

The Plant Man's Responsibility

The Chief Responsibility for Good Service Consists in Good Plant, Properly Installed and Maintained—Outline of Preventive Maintenance Survey and Results Obtained—Paper Presented at Recent Up-State New York Convention

By Leo K. Farnan,

Plant Methods Supervisor, Rochester Telephone Corp., Rochester, N. Y.

Service has a genuine appeal to the imagination. Everyone likes to feel that his efforts have resulted in satisfaction to someone else, that he has added in some way to the sense of security or well-being of individual, group or community, that he has filled a need.

It is possible that service had its introduction to industry through the telephone field. To telephone people it has a specific importance. However, exploitation of the advertising value of service by the trade has narrowed its meaning to some extent so that telephone service, in the public mind, has come to be associated directly with the operator. Plant men know that many subscriber complaints, which to them indicate equipment failure or breakdown of the coordinated plan, carry the impression that the operator was at fault.

Operator Unfairly Blamed

This is most unfair to her. She may be the original "Voice with a Smile" girl; she may be operating intelligence and efficiency personified; but, unless plant and equipment are built and maintained in accordance with well-established standards she cannot give good service. Unfair also, because service includes every member of the telephone family, an organization which exists for the sole purpose of bringing to its customers the use of facilities for the personal transmission of intelligence.

Service is our product. It is what we sell and it may be that this direct sale of service has lost its significance for the public in the advertising matter of trade. The public have come to think of service as the immediate need.

The operator has no more responsibility for service than her skill and dexterity in making efficient use of the plant and equipment provided; it is therefore unfair to arbitrarily place the blame for poor service upon her. So it is with the other members of the organization in their respective responsibilities.

Plant First Service Responsibility

It is apparent to telephone folks that our chief responsibility for service is in providing good plant and equipment, properly installed and maintained. Granting the first two, the most important and ever-present problem of service responsibility is maintenance. Maintenance, undoubtedly, has more to do with the quality of service than any other factor.

The plant man must not only do a good job in the repair work of restoring interrupted service, but he must be alert to conditions which are likely to result in service interruptions. The greater his foresight in these matters the more economical maintenance costs will be.

The fewer reported troubles there are, the greater the amount of time available for planning and carrying on maintenance

"The Improvement in Service and the Constant Endeavor to Improve It," Says Mr. Farnan, "Is Peculiarly the Plant Man's Problem, Because of His Nearness to It. . . . In Many Instances, the Plant Man Is Looked Upon as the Company's Representative in Community Life. It Is of the Utmost Importance That He Reflect the Company Spirit in a True Sense."

work, and with the exception of the work resulting from heavy storms, much can be done to level the seasonal peaks and valleys in the plant work schedule.

There can be no argument against the statement that the plant man's responsibility for service means primarily that he must do all of the things necessary to prevent interference with transmission service. It is not a new thought. Every plant man has learned as much, very early in his telephone experience. He does know, too, that frequently he has so much trouble to be cleared that there isn't time for anything else. True consideration of service urges the greatest number of troubles for a day's work in order to restore service to as many subscribers as possible. "Get it working" has been a familiar slogan for years.

Re-occurring conditions of this kind, especially in a new plant, soon result in a bad condition generally, unless prompt measures are taken to avoid it. Slack guys result in broken poles. This may be the beginning of a number of broken poles, with their attendant troubles. Slack wires result in broken ties and broken wires. Loose fixtures and fittings are frequently reported as causes of troubles. All of these things eventually necessitate a trip to restore service that need not have been interrupted. Likewise there are many items of station complaint familiar to us which forethought, observation and initiative will forestall.

Maintenance statistics over a period of years have proved that the repairman or wire chief has one of the most important responsibilities for service in the organization. For example, it was found that, so-called "repeated" complaints had less of the time element and more of the mechanical than had previously been considered.

That is to say, ordinary wear on equipment and apparatus, due to use, would not be sufficient to cause its failure in the relatively brief time between complaints, but that failure of the particular unit was imminent at the time of a previous visit and might easily have been observed by the mechanic, had the importance of thinking about them been previously pointed out.

It had been customary to consider that a complaint received within three months of a former complaint would be called a repeater. Our check indicated that complaints might be considered as repeaters after six months or a year because of conditions existing which had been underestimated or overlooked on a previous trip.

It was found, too, and quite naturally, that repeaters have something of a ratio to usage so that two or three cases per year on a business telephone did not necessarily constitute a repeater, but that one case per year on a residence telephone might be so considered. And why not?

Assume a subscriber's residence is served directly from a cable terminal; there is standard drop wiring, standard station wiring, a desk telephone properly located and with respect to collision and abuse. What is there about it to get out of order due to usage or wear; what is there on it that won't last a year? Nothing, except possibly the cords. Even those will stand up for long periods under the twisting and tying to which they are frequently subjected in service.

I believe it is fair to assume that nearly

every wire chief has active subscriber cards in his files on which he has no trouble recorded for at least two years, possibly five years, or even longer.

Preventive Maintenance Survey.

These observations, taken chiefly from exchange trouble report records, suggested a survey which was undertaken with the idea of determining to what extent preventive trouble maintenance could be expected to reduce service interruptions. Accordingly, work was begun in the city area because of the extensive cable plant and the corresponding service hazard in time of failure. The advent of the gas pressure method of testing cables greatly facilitated the initial program. The results achieved were sufficiently encouraging to warrant a broad expansion of the plan.

The suburban area, with its relative preponderance of open wire lines, presented a different set of conditions—the increased number of pole line miles per man; road conditions during bad weather and various other things common to suburban exchange maintenance that require consideration in arranging a preventive maintenance plan.

It was not considered necessary or advisable to increase the maintenance force for this work. It was also apparent that, should extra help be provided, a great deal of the wire chief's time would be required to assist in planning and advising as to road information, reports, data, etc. Consequently, it was estimated that little more time would be required for him to do the whole job than to assist in this manner. In either case he is responsible for the final result.

The first consideration was to insure a complete inspection of the exchange on a part-time basis. In this the wire chief, to a large extent, solved the problem for himself. A closer analysis of routine troubles and exchange work enabled him to segregate the less important items of work and so localize his efforts as to effect a considerable saving in time.

Few cases of trouble require less than 15 minutes of clearing time; if four of those are mouthpiece, number cards or any of the multitude of little troubles which can be held over for a day, an hour has been made available in which to work on inspection. Accordingly, a patrol and inspection plan was developed by which it is expected to cover each exchange district once a year.

Routine Inspection of Entire Plant.

The plan provides for a routine inspection of all plant by the wire chief forces. This inspection and the resulting repair work is a part of the daily routine. The schedule provides that patrol of pole lines within the corporation limits shall be made between November 1 and April 1, which is the period in this section when rural roads are most difficult of travel. Patrol of pole lines including substations outside the corporation limits is made between April 1 and November 1.

All defective or non-standard conditions are repaired or made standard at the time of inspection except those of a character requiring additional help, in which case a regular order is issued covering the work.

Station inspections within the corporation limits are not necessarily made at the time of line patrol, but are considered separately as local requirements indicate.

Topographical maps are furnished each wire chief, showing the exchange boundary lines and all of the pole lines therein, their route numbers, and the number of junctions and branch line poles.

A pole line card record is kept of each pole line route after the manner of a subscriber line record, the route number shown on the topographical map appearing in place of the subscriber's line number. On this record is shown the inspection or patrol dates, pole numbers inspected and the work done, except that drop and station inspection work are shown as inspection trouble on the regular subscriber's line card.

Three inspection reports are made, one for trimming involving right-of-way trouble or large trimming jobs which cannot be done at the time of inspection, one for each station inspected, and the third weekly report summarizing the line patrol work. All of these reports are forwarded weekly for compilation and analysis.

Analysis of Reports Interesting.

You may well suppose that the analysis of these reports does not indicate that the operator is remiss nearly so often as she has been accused. On the contrary, it emphasizes clearly that there are many items incident to good service which have no direct interest for the subscriber, and yet they mean much in the quality of service he receives. More than this, it indicates a new sense of responsibility to the plant man and that he is discharging it in a typical manner.

This is as it should be. We have assumed the responsibility for service which will meet the ever-changing demands of industry and trade. Telephone progress has been industrial progress. We are constantly striving to anticipate the demands of service. This has always been so in the engineering branches of the industry, particularly along development and construction lines.

Maintenance, financially, has often been classified as one of the big leaks which no amount of sand bags has been able to stop and, yet, maintenance has been a considerable factor of progress.

In the past few years, particularly, improved maintenance practices have provided many additional subscriber hours of uninterrupted service. It is recognized that improved materials and equipment have contributed a great deal to this result. Nevertheless, the improvement in service and the constant endeavor to further improve it is peculiarly the plant man's problem because of his nearness to it. By his painstaking efforts in this direction he has provided some valuable and interesting methods for service improvement and the most valuable of them have been along preventive lines.

In the light of present-day experience it is unquestionably the right line. Service interruptions become fewer and fewer because day by day more of their causes are being removed. Prevention is admittedly superior to cure; and yet this does not sum up our service responsibilities,

Plant people are coming to a fuller realization as to how definitely their responsibilities for service are associated with community life. In many instances the plant man is looked upon as the company's representative in this community. It is of the utmost importance that he reflect the company spirit in a true sense.

By giving freely to civic enterprises of the time and means at his disposal; by contributing the benefits of his training in safety and first-aid and by the numerous opportunities for service which lie outside of physical plant problems, the plant man can contribute a great deal to the fulfillment of community life. It is a duty, really; our own success depends upon the success of those we serve. In contributing to them we are reaping the reward of satisfaction which comes from good service and our efforts in this direction are much more likely to be recognized and appreciated and our public relations will be correspondingly more cordial.

This is the plant man's responsibility for service.

Speaker Predicts Bright Future for the Southwest.

A bright future was predicted for the Southwest, including the states of Oklahoma, Kansas, Missouri, Arkansas and Texas, by L. J. Bullis, general commercial superintendent, Southwestern Bell Telephone Co., Oklahoma City, in an address before the third annual Southwestern Foreign Trade Conference held in Oklahoma City.

Pointing out that the increase in the number of telephones is one of the best barometers as to the development of an area, Mr. Bullis cited figures showing that the number of Bell telephones in the area comprising Oklahoma, Arkansas, Missouri, Kansas and Texas increased 151 per cent from January 1, 1920, to April 1, 1931.

Canada's Largest Telephone Directory Issued in Montreal.

The July bi-annual issue of the directory of the Bell Telephone Co. of Canada in Montreal, the Dominion metropolis, contains 804 pages and weighs about three pounds, maintaining the Canadian record for size.

In the preparation of the 231,000 copies, it is estimated that 345 tons of paper and 10,000 pounds of ink were required. More than 86,000 listings were changed since the previous edition last January.

Here and There in Telephone Work

P. B. X. Current Supply; Use of Sulphuric Acid.

By John A. Bracken.

In a general way an acid may be defined as a substance that possesses a sour taste and has the property of turning blue litmus (a dyestuff extracted from certain lichens) red. A dyestuff or substance which undergoes a change in color upon the addition of an acid or alkali is called an indicator. An acid may also be said to be a substance which when dissolved in water produces hydrogen ions; that is, electrically-charged particles, atoms or groups of atoms existing in solution.

Why certain solvents, such as water, should cause or permit the splitting of a compound into electrically charged bodies, called ions, has not yet been very clearly explained. That they do, however, has been demonstrated with reasonable certainty. The evidences are described in texts of physical chemistry. Although all acids contain hydrogen, not all substances that contain hydrogen are acids. The hydrogen must be held in the compound (a composition of two or more elements or ingredients) in a certain manner.

The properties of acids are, in general, opposite to those of bases, and may be neutralized (rendered inactive) by the action of bases. It is rather difficult to give an exact definition of the term base, since it is used in the science of chemistry with somewhat different meanings. However, such substances as caustic soda and potash, ammonia (a mixture of nitrogen and hydrogen), lime water and certain other common substances, such as lime, washing soda, etc., will act as a base for acids.

H_2SO_4, the symbol used for sulphuric acid, may be translated thus: Two hydrogen atoms, one sulphur atom, and four oxygen atoms. A molecule composed of these makes what is called a particle of sulphuric acid. Sulphuric acid, also called oil of vitriol, vitriolic acid and acidum sulphuricum (Latin), is commonly used as one of the elements comprising the electrolyte in P.B.X. storage battery cells. It is one of the so-called strong acids; that is, when dissolved in pure distilled water is largely dissociated (separated) into ions.

Surphuric acid is a thick, oily liquid and is manufactured in several grades. The crude commercial grade generally contains arsenic. Hence for use in storage cells care should be taken to procure only chemically pure (C. P.) acid.

In concentrated form, sulphuric acid is very hygroscopic; that is, it has a great affinity for water. If allowed to stand exposed in an open vessel it rapidly absorbs moisture from the atmosphere. It may easily absorb so much water in this way that the container will overflow. Not only can sulphuric acid absorb water, but it is also able to extract the elements, hydrogen and oxygen, from a compound containing them, decomposing the compound and combining with the water so formed.

For this reason most organic substances such as wood, paper, cotton, and even flesh, all of which contain much oxygen and hydrogen in addition to carbon, are charred or burned by the action of the concentrated acid. On this account it is very destructive to clothing, although less so to pure wool than to cotton fabrics.

In concentrated form, C. P. sulphuric acid has a specific gravity of 1.820 to 1.840 or 64 to 66 degrees Baume, and contains 94 per cent acid, the remainder being water. The Baume hydrometer is used in certain foreign countries in place of the specific gravity hydrometer and is practically the same as the specific gravity hydrometer except that the scale graduations are calculated from different constants.

Baume hydrometer scales are graduated on the following principle: The zero point corresponds to the specific gracity of water for liquids heavier than water. A solution of 15 parts of salt in 85 parts of water corresponds in specific gravity to 15 degrees Baume, and between that and zero 15 equal degrees are laid out. The degrees are carried down below this point. The zero point for liquids lighter than water corresponds to the specific gravity of a solution of 10 parts of salt to 90 parts of water.

The specific gravity of water is taken as 10 degrees Baume. This gives 10 degrees which are continued up the scale. The method of changing the reading of a hydrometer for liquids heavier than water from terms of specific gravity to the Baume scale or vice versa follows:

$$\text{Specific gravity} = \frac{145}{145 - \text{Baume degrees}}$$

$$\text{Baume degrees} = 145 - \frac{145}{\text{Specific gravity}}$$

Example: What are the Baume degrees of a P. B. X. storage battery cell that shows a specific gravity of 1.250 at 60° F.?

The Baume degrees =

$$145 - \frac{145}{1.250} = 29\text{B}°$$

The science of chemistry informs us that if two liquids are introduced into a vessel (as, for instance, concentrated sulphuric acid and pure distilled water) so that the denser (acid) is below and the lighter (water) is above, then just as in the case of gases, diffusion (circulation) will take place, some of the lighter liquid traveling down and mixing with the heavier in the vessel, and vice versa.

The rate at which liquids diffuse is extremely small, however, as compared with the rate at which gases diffuse. This fact confirms the molecular theory of the constitution of liquids and gasses, for in

TRANSMISSION ENGINEERS

By "Buck."

I'd like to know, who is this here dog-gone Transmission Engineer? Will someone kindly make it clear: What does that feller do?

You see him settin' in his chair, except when weather's bright an' fair, when he goes out to git some air. Oh, can't you tell me who it was that hired this nutty guy? An' how the heck does he git by? By gosh! No matter how I try, I cannot make it out.

What are these transpositions which he fools with, like a durned ole witch? An' tell me why we hafta switch th' wires on ev'ry route!

An' what are "Volts" an' what are "Ohms," transmission guys have written tomes about? I'd like to crack their domes—they jes' don't do no good.

The "Whoop-an'-Holler" lines git by, an' so could we if we'd jes' try, without no durn transmission guy to tell us how.

Let's put 'em sawin' wood or diggin' ditches fer their pay. They might do some good that-a-way. I'd make 'em work instead o' play, you bet yore dad-gum ears!

But whoa! Are they jes' takin' space? By heck! They hit a durn hot pace an' occupy a def'nite place—transmission engineers!

gases it is supposed that the molecules travel about, only occasionally coming near enough to the other molecules to influence motion, the greater part of their path being traversed uninfluenced by other molecules.

In a liquid, on the other hand, although the molecules move about, they never get far enough away from the adjacent molecules to escape from the influence of these molecules, so that although a liquid molecule may move relative to neighboring molecules, as soon as it passes out of the range of influence of one set of molecules it comes within the range of other molecules. Hence the molecular motion in liquids is much more constrained than in the case of gases, and the rate of diffusion is expected to be slower.

In P. B. X. storage battery practice sulphuric acid is combined with distilled water to form the electrolyte used in the cells. If concentrated acid were put into the battery cells, it would quickly ruin them. It must, therefore, first be diluted with water to the proper strength. The proportion of water used differs with the specific gravity of various types of storage cells, as specified by the maker.

Protection on Cable Poles Where Open Wires Terminate.

Your page on TELEPHONY's Engineering Data is interesting, but permit me to supplement the article in the July 18 issue on protector mounting on cable terminal poles where open wire leads terminate.

Theoretically, Mr. Burden's one protector takes care of all lightning discharges, but after having numerous failures to stop spraying of discharges to drop wires not protected, and leakages going over the gaps before they are grounded, I follow the Bell company's practice of installing a similar protector one pole from the terminal with the same short path to ground. Since doing this we have not had a single case of lightning trouble in the cable.

Sawtooth type carbons are better but any type may be used in either or both protectors.

Berryville, Ark. R. E. NORRIS.

Canada's Governor-General Studies Intricacies of Communication.

Lord Bessborough, the governor-general of Canada, was an interested visitor to three of the largest telephone buildings in Montreal recently. He and his party, including Lieutenant Fuller, aide-de-camp, and J. H. Crowdy, assistant secretary, were guests of the Bell Telephone Co. of Canada when they were welcomed at the company's Beaver Hall Building headquarters by J. E. Macpherson, senior vice-president; P. A. McFarlane, vice-president; W. H. Black, secretary-treasurer; E. Palm, vice-president and comptroller; P. Beullac, K. C., senior counsel, and Dr. A. R. Pennoyer, the company's physician.

After a visit to the board room and the executive offices, the governor-general was conducted through the museum, archives, medical department, library and lounge rooms, as well as the large accounting offices. Later, the party visited the Plateau exchange to view Montreal's biggest dial office and the manual exchange at Westmount, a suburban city of Montreal.

SPEED
AND MORE SPEED!
EIGHT years ago it took nearly eight minutes, on the average, to make connections on out-of-town telephone calls. Today the average speed of connections on all out-of-town calls—no matter how great the distance—is sixty seconds—JUST ONE MINUTE!
Eight years ago it took from five days to a week from the time orders were received to install telephones. Today they are installed within an average of two days, or on the dates requested by customers in over 98% of the orders given.
THE CHESAPEAKE AND POTOMAC TELEPHONE COMPANY
725 Thirteenth Street N. W. (Bell System) MEtropolitan 9900

WEST
NORTH
SOUTH
EAST
★ IT WORKS BOTH WAYS ★
Once in a while we hear someone say, "I get along without a telephone; I seldom need to make a call."
Such a view of the usefulness of the telephone fails to take into account the value of incoming calls. Almost any telephone user can recall instances when a message received has been of the utmost importance—has meant as much as a dozen or a hundred outgoing calls.
The privilege of making calls is only half of your telephone service. The other half is your accessibility to calls from anyone else, anywhere, any time. This feature alone has a value far greater than the moderate amount a telephone would cost you.
★ ILLINOIS BELL TELEPHONE COMPANY ★

Recent Advertisements Used by Chesapeake & Potomac Telephone Co., the Illinois Bell Telephone Co. and Indiana Bell Telephone Co.

Telephone Advertising Copy That Should Produce Results.

On this page are reproduced three cleverly-designed telephone advertisements which have been used recently in different parts of the country. The one emphasizing "Speed and More Speed" appeared in many newspapers in the territory of the Chesapeake & Potomac Telephone Co.—Maryland, Virginia and West Virginia, and the District of Columbia—during the first week of July. This advertisement is in harmony with the company's plan and endeavor to increase the use of the telephone by keeping its advantages constantly before the public eye. The text of this advertisement reads:

"Eight years ago it took nearly eight minutes, on an average, to make connections on out-of-town telephone calls. Today the average speed of connections on all out-of-town calls—no matter how great the distance—is 60 seconds, just one minute!

Eight years ago it took from five days to a week from the time orders were received to install telephones. Today they are installed within an average of two days, or on the dates requested by customers in over 98 per cent of the orders given.

These are but two of the many outstanding improvements in telephone operation which have been introduced during the past few years in the interest of furnishing better telephone service."

The advertisement of the Illinois Bell Telephone Co. directs attention to the convenience the telephone affords, in making it possible for the subscriber to receive incoming messages. To quote the advertisement:

"Once in a while we hear someone say, 'I can get along without a telephone; I seldom need to make a call.' Such a view of the usefulness of the telephone fails to take into account the value of incoming calls. Almost any telephone user can recall instances when a message received has been of utmost importance—has meant as much as a dozen or hundred outgoing calls.

The privilege of making calls is one-half of your telephone service. The other half is your accessibility to calls from anyone else, anywhere, any time. This feature alone has a value far greater than the moderate amount a telephone would cost you."

State-Wide Wisconsin Investigation

Wisconsin Public Service Commission Orders State-Wide Investigation of Rates and Service of Wisconsin Telephone Co. as Result of Situation Revealed in Madison Case—Departure from Usual Manner of Conducting Hearings

A state-wide investigation into the rates and services of the Wisconsin Telephone Co. is to be initiated by the Wisconsin Public Service Commission, according to an order handed down July 30. This will be "the most extensive rate case in the history of regulation in Wisconsin, the commission announces.

Action on the petition of the company for an increase in rates in Madison will be held up pending the completion of the state-wide investigation by the commission, which will require at least a year. The investigation is ordered "because of the situation revealed by the testimony in the Madison case and because to hold separate investigations on the complaint of the city of Milwaukee and other municipalities would be wasteful of energy, time and money."

Orders Issued by Commission.

Separate orders were issued by the commission, on July 30, with respect to the state-wide investigation and with respect to the Madison rate case. The commission's conclusion in the Madison case was that a decision on the company's petition for a 25 per cent increase in rates cannot be made until there has been furnished the data called for in the order, and the proceeding is to be kept open pending the submission of these data.

Opinions in both cases were written by Commissioner David E. Lilienthal, and were concurred in by Chairman Theodore Kronshage, Jr., and Commissioner A. R. McDonald.

The state-wide investigation initiated at the same time will comprehend the rates and service in Madison, but as to how that proceeding and the Madison case are to be coordinated, if at all, it leaves "to be determined after we have had opportunity to confer with representatives of the company and other interested parties."

In order to expedite the state-wide investigation, the commission departs from its usual manner of conducting hearings of this nature and definitely directs the telephone company to prepare and submit certain information. In addition, it proposes to make an examination of records and books of the company with its own staff.

Data Commission Wishes.

The data for which the commission calls is identical for both the Madison and the state-wide order and relates chiefly to the cost to the American Telephone & Telegraph Co. of rendering the engineering, financial, accounting, research, legal and other services which the American company agrees to furnish the Wisconsin company under the terms of the license contract; to the relation of the Wisconsin company and the American Telephone & Telegraph Co. to the Western Electric Co.; and to the apportionment of toll and local operations at the Madison and other exchanges.

In justification of calling for additional data on the license contract, the commission analyzes the exhibits presented by Charles A. Heiss, comptroller of the A. T. & T. Co., and concludes that the fairness of the apportionment submitted by Mr. Heiss requires verification. "The results of the foregoing analysis raises serious doubt in our mind as to the fairness of the apportionment," the commission states.

The suggestion is made that the commission be furnished with statements for each year from 1919 to 1931 showing the American Telephone & Telegraph Co.'s revenues and expenses; first, for its long lines department operation; second, its license contract operations; third, its holding company operations, outlining the revenues from each of such operations for each year, and the expense attributable to each of such operations; the depreciation reserve at the beginning and end of each year, and the average for each year for each department; and the rates of return for each year on the long lines investment before and after deducting depreciation reserves.

Three Questions Trouble Commission.

In his opinion, Commissioner Lilienthal concedes as the propriety and the effectiveness of the services of the A. T. & T. to the Wisconsin company, but states that the commission is troubled by three questions:

First, are the researches and activities of the general staff of the American Telephone & Telegraph Co. on behalf of the associated companies actually reflecting savings to the associated company?

Second, assuming that the activities of the American Telephone & Telegraph Co. under the license contract do produce economies, are these economies passed on to the subscriber for telephone service in Madison or other Wisconsin cities in the Bell System?

Third, because it is a matter of common knowledge that the American Telephone & Telegraph Co. and the Western Electric Co. are also engaged in the movietone, telephoto and other telephone businesses, it may be said that its extra-telephone services and equipment are essentially by-products of the telephone business, and the opinion adds:

"The present record lends color to the conclusion that the entire charge of the development of the investigations by the American Telephone & Telegraph Co. prior to the time when these by-products became practical for manufacture and sale has been charged to Bell System subsidiaries and hence to Wisconsin telephone users."

The question then arises as to how the profits made by the American Telephone & Telegraph Co. and the Western Electric Co. by reason of the development of these by-products be considered, if at all, in determining the reasonableness of arrangements existing between the American Telephone & Telegraph Co. and the Wisconsin Telephone Co.

Western Electric Relationship.

The real issue in the Western Electric Co. relationship is stated thus: "Conceding that large scale production and the special business relationship between the Wisconsin company and the Western Electric Co. results in economies of production and distribution, to what extent have such economies been passed on to the Wisconsin Telephone Co. as one of the associated companies?"

The commission says it is clear that the Western Electric Co. relationship is a vital issue and points out that in the year 1930 (to October 31) in the Madison exchange alone there was added $75,000 in station equipment and in the year 1929 almost $100,000, and in the same period there was added $110,000 and $40,000 in exchange underground conduit, and $50,000 and $30,000 in exchange underground cable. Most, if not all of it, represented purchases from the Western Electric Co.

"We would be derelict in our public duties," Commissioner Lilienthal wrote, "if we did not thoroughly investigate this issue, and the fact that heretofore no such investigation to our knowledge has ever been made by any commission does not justify us in holding back. All the pioneer work in the field of regulation is not over. I can not believe that the resources of regulatory technique will be found inadequate to meet even so involved and intricate a problem as this Western Electric Co. relationship presents."

Toll Charge Conclusion.

The commission overrules the principles announced in previous decisions by earlier Wisconsin commissions, and reaches the conclusion that the local exchange must receive credit for part of the toll charge.

The investigation is to include the relation of the Wisconsin Telephone Co. with affiliated corporations, including the Amer-

(*Continued on page* 28.)

Strowger Dial Brings Distant Communities Into Close Contact

COMMUNICATION is daily drawing thousands of individuals and communities into closer contact. No matter how remote the location, no matter how inaccessible—even though roads are blocked with snow or made impassible by floods—the voice of the telephone carries through. Telephone companies may well be proud of the part they are playing in constructing and maintaining these avenues of speech.

But to continue to exist, telephone companies must make money. Unfortunately, many telephone companies today are providing their small communities with telephone service—at a loss. Many small exchanges are being operated as money-losers.

This need not be so. It has been demonstrated that Strowger sectional-type unattended dial units place small exchanges—even where there are but a few telephones—on a profitable operating basis. All local operating expense is eliminated—toll and information calls are handled over trunks at the most convenient toll center. With this modern method, hundreds of companies are now operating small exchanges PROFITABLY, which were either unproductive or losing money before. Write TODAY—and let our engineers show you what Strowger operation can do for YOU.

[*This is one of a series of advertisements illustrating the application of Strowger Dial operation to telephone exchange networks.*]

Automatic Electric Inc.

Manufacturers of
Strowger Automatic Dial Telephone and Signaling Systems
Factory and General Offices: 1033 West Van Buren St., Chicago, U. S. A.

ASSOCIATED COMPANIES
American Electric Company, Inc., Chicago
International Automatic Telephone Co., Ltd., London
Automatic Telephone Manufacturing Co., Ltd., Liverpool
The New Antwerp Telephone and Electrical Works, Antwerp
Eugene F. Phillips Electrical Works Limited, Montreal

(*Concluded from page* 24.)

ican Telephone & Telegraph Co., the Western Electric Co., the Bell Telephone Securities Co., the Graybar Electric Co., Bell Telephone Laboratories, Inc., and other corporations in anywise affiliated with affiliates of the Wisconsin company.

The commission also finds that the proceeding would make necessary an investigation of the books and records of the company and orders that the expenses reasonably attributable to such investigation be assessed against and charged to the Wisconsin Telephone Co.

Details are demanded of the company prior to the hearing of the state-wide investigation relative to relations of the Wisconsin company to the American Telephone & Telegraph Co. and the relations with the Western Electric Co. In all there are 22 specific requests for data, covering many pages and calling for virtually all the relevant data in the New York offices of the American Telephone & Telegraph Co. and the Western Electric Co.

Federal Radio Commission to Investigate I. T. & T.-Ericsson.

An inquiry into the recently consummated arrangement between the International Telephone & Telegraph Corp., parent company of the Mackay radio and telegraph interests, and the L. M. Ericsson Telephone Co., Swedish communications organization (TELEPHONY of June 27, 1931), will be instituted to ascertain whether it conflicts with the radio law, upon receipt of official information as to details, it was stated orally July 23 at the office of the Federal Radio Commission, according to the United States Daily.

Possible violation of Section 12 of the Radio Act, which specified that no radio facilities may be assigned to companies having stock ownership affiliations with alien companies or individuals is involved, it was said. The commission has not been officially apprised of the transaction, and is awaiting word in connection with applications for renewal of radio licenses held by the Mackay Radio & Telegraph Co., in which details as to ownership and other pertinent information must be specified.

It was explained orally at the commission's office that the I. T. & T., through the Mackay Radio & Telegraph Co., holds licenses for international radio communication, ship-to-shore operations, and experimental radio activities. The Mackay company also is an applicant for facilities with which it proposes to offer a domestic radiotelegraph service supplemental to the wire telegraph service maintained by the Postal Telegraph Co., another affiliate.

The I. T. & T., according to commission records, is engaged in radio, telegraph, telephone and cable activities, not only in the United States, but in Latin American countries. It maintains the Spanish telephone system also.

Section 12 of the Radio Act, under which the commission will make its study of the arrangement, reads as follows, in part:

"The station license required hereby shall not be granted to, or after the granting thereof such license shall not be transferred in any manner, either voluntarily or involuntarily, to (a) any alien or the representative of any alien; (b) to any foreign government, or the representative thereof; (c) to any company, corporation, or association organized under the laws of any foreign government; (d) to any company, corporation or association of which any officer or director is an alien, or of which more than one-fifth of the capital stock may be voted by aliens or their representatives or by a foreign government or representative thereof, or by any company, corporation or association organized under the laws of a foreign country."

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Alabama Legislature Passes Telephone Control Bill.

Before its final adjournment on July 25, the house of the Alabama legislature passed a bill (S. 511) previously passed by the senate to enlarge the authority, powers and jurisdiction of the Alabama Public Service Commission. The new bill provides for supervision and regulation of the financing and securities of all telephone companies subject to regulation by the commission, other than those specifically excepted.

Hearings in Southern Indiana Telephone Rate Case Continued.

The federal court hearing in the Southern Indiana Telephone & Telegraph Co.'s injunction suit against the Indiana Public Service Commission was continued until September 21 by Samuel Dowden, special master in chancery, at the request of defense counsel, following a completion of the plaintiff company's testimony on July 29. The company seeks to enjoin the commission from preventing a higher rate schedule from becoming effective in the 30 towns and communities which it serves.

Dr. Haskell Lett, veterinarian and postmaster at Seymour, engaged by former President L. C. Griffitts as public relations counsel for the Southern Indiana company, called to the witness stand on July 27, denied that any of the money he received was used to influence members of the commission to approve rate increases. He said he had received a total of $6,635 as salary for his 27 months of service in promoting goodwill between the company and the public.

Calvin McIntosh, former member of the Indiana commission, who wrote the final order denying the rate increase, testified on July 27 that he had been a member of the commission for four years prior to May 1, 1931, and that he had written the final order in the rate case which was handed down in October, 1930. Mr. McIntosh denied ever discussing the case with Bert Fuller, Indianapolis insurance man and campaign manager for Governor Leslie in the primary election, and asserted that he did not know Mr. Lett.

On cross-examination, Mr. McIntosh was asked whether he had requested Mr. Griffitts to hire his daughter as cashier and the witness said he had not. He also denied telling George W. Hufsmith, deputy attorney general, in a conference, that he thought the company deserved an increase.

Bert Morgan, associate of Mr. Fuller in the 1928 campaign and a partner with him in his insurance business, testified that he had known Mr. Lett 15 years and that Mr. Lett had borrowed $1,000 from him and Mr. Fuller in March, 1929, and gave them a note. They gave Mr. Lett cash. A year later he returned the amount in checks of $400 and $600, he said.

James W. Noel, of counsel for the telephone company, questioned Mr. Morgan at length concerning the loan to Mr. Lett, particularly as to why they had given it to him in cash when that necessitated a trip to the bank.

"There was no reason," Mr. Morgan said. "Mr. Lett told us that either checks or cash would do."

Mr. Morgan denied that there was any significance to the fact that his firm wrote a $50,000 policy on the life of E. S. Welch, general manager of the company. Mr. Morgan also denied that Mr. Fuller had told him that he (Fuller) had called Mr. McIntosh and told him to "go easy on the Southern Indiana boys" when a rate petition was pending.

George W. Hufsmith, deputy attorney general, testifying on July 29, asserted that Mr. McIntosh had told him that he believed the plaintiff company was entitled to

a substantial increase in rates, although Mr. McIntosh had denied this on the witness stand at the previous day's hearing.

The testimony followed an objection by Clyde H. Jones, attorney appearing as a friend of the court. Mr. Jones contended that any statement made to Mr. Hufsmith by Mr. McIntosh was in the nature of conversation between attorney and client, as Mr. Hufsmith was representing the attorney general's office. The court held that Mr. Hufsmith could answer if he wished.

Mr. Hufsmith was questioned regarding an alleged attempt to compromise with the commission, in which it was said that counsel for the plaintiff company had proposed to dismiss the injunction suit, provided a small increase in rates was granted. The commission later wrote an order of denial. The court refused to admit the introduction of the order as evidence and excluded the testimony regarding the compromise on motion of defense counsel.

The plaintiff's counsel sought to show, by the testimony of Charles O. Pinkerton, that the first time the employment of a public relations counsel, came to the attention of officers of the company was at a meeting of directors in Seymour, November 21, 1930. Mr. Pinkerton had gone to Seymour to inspect the company's books.

John F. Kent, a director, noticed the checks which had been paid to Dr. Haskell Lett, public relations counsel, and asked who Mr. Lett was. Mr. Griffitts replied that Mr. Lett was postmaster. Mr. Pinkerton said that Mr. Kent asked what he was doing and Mr. Griffitts replied that he was working on a special rate case. Mr. Pinkerton added that Mr. Kent wished to know what sort of work and that Mr. Griffitts had said it was confidential work for him.

O. L. Doud, former controller of the company, was a witness on July 28. He asserted that he opposed the employment of Mr. Lett, veterinarian and postmaster at Seymour, as public relations counsel. He also testified that he differed with Mr. Griffitts on the amount of Mr. Griffitts' expenditures.

Mr. Doud asserted that he resigned because he and directors of the company could not reach an agreement on the financial policy of the company. He also said he had signed several checks for Mr. Lett although he did not understand what they were for. He also received statements on a premium for a $50,000 life insurance policy issued by Bert Fuller and Bert Morgan, Indianapolis insurance agents who are active in politics, to E. S. Welch, general manager of the company, he said.

Mr. Doud said he also had been controller for the Central Ohio Telephone Co., another utility in which the firm of Kent, Grace & Co. was interested. Kent, Grace & Co. is a Chicago firm holding stock in the Southern Indiana Telephone & Telegraph Co.

Counsel for the company objected to a cross-examination by Mr. Hufsmith as to whether the Ohio company employed a public relations counsel similar to Mr. Lett. Mr. Hufsmith contended that if he could show that the Chicago firm employed such an official in the Ohio company, it would prove that it had knowledge of the purpose for which Mr. Lett was employed. The utility has contended that Mr. Lett had been employed by Mr. Griffitts without knowledge of other officials of the company. The court, however, sustained the objection.

Thomas Grace, a member of the firm, testified that he had not known of Mr. Lett's employment until late in 1930. At that time, Mr. Griffitts asserted, according to Mr. Grace, that Mr. Lett was employed because he had some special work to do.

Chicago Franchise Becomes Law; Has Mayor's Signature.

The ordinance granting a new 23-year franchise to the Illinois Bell Telephone Co. to operate a telephone business and transit sound and signals or other means of communication by means of electricity (television), in the city of Chicago, became a law on July 31. It was passed by the city council on July 20 and signed by Mayor Cermak at the council meeting, July 31.

Before signing the ordinance the mayor had received a 15,000-word opinion from Corporation Counsel Sexton, holding the ordinance to be legal in all its details. "The measure is a valid exercise of the powers of the city to permit use of its streets by the Illinois Bell Telephone Co., and does not contravene the state public utility act or interfere with the control of the company by the Illinois Commerce Commission," the opinion states.

It says further that "the ordinance contains no ambiguous language likely to cause future controversy or litigation, and it reserves to the city hall all powers it may hereafter acquire by legislation extending municipal powers or by a statutory or constitutional grant of home rule."

The ordinance was passed by the council on July 20, after a prolonged fight in committee and on the council floor, by a vote of 37 to 12.

The ordinance, as set forth in TELEPHONY of July 25, fixes the term of the telephone franchise at 23 years from the expiration of the old franchise. This makes the term end in 1952. After that six months' written notice by either city or company is sufficient to terminate it. Compensation to the city is fixed at 3 per cent of gross revenues, whereas the old ordinance specified gross receipts.

"Wired Music" Asks Commission to Authorize Leased Wires.

Wired Music, a New York organization, has applied to the New York Public Service Commission for a ruling as to whether the New York Telephone Co. shall be required to lease lines for transmitting audio frequency currents which can be converted into music in the home, according to S. Kerner, secretary of the concern, which has temporary offices at 351 West Forty-second street. A hearing was held July 31.

Mr. Kerner said apparatus had been designed and was waiting acceptance by his company, pending the ruling of the commission. A central studio has been planned, from which vocal and musical programs are to be sent over the wire lines to homes. Explaining that his system and apparatus were entirely new and unlike other devices, Mr. Kerner said:

"Although our proposition, which has been refused by the telephone company—hence the hearing—is entirely new, the idea is old. The telephone company declared we were pioneers in this particular field and declared our proposition has great possibilities, but, with regard to the furnishing of lines, kept putting us off, hence our appeal to the public service commission. We cannot see why we should not have lines when the wires are furnished other companies for many purposes."

The New York Telephone Co., although it now provides lines for radio and other communication systems, objected at the hearing to being placed in "the wire vending business."

The Wired Music organization, which is still in a formative stage, was represented by Robert M. Miller, who explained that his group desired nothing more than the service offered by the telephone company to radio companies, stock ticker concerns and burglar alarm systems. The telephone company had denied the means for wired music, it was explained, and so a formal complaint was made to the commission.

Mr. Miller said his organization had assumed there would be no difficulty in leasing the wires from the telephone company, and had made tentative arrangements with hotels to transmit the music, which would be sent to subscribers each day.

Under cross-examination by E. W. Beattie, attorney for the telephone company, Mr. Miller admitted that he and his associates planned to extend their music transmission into a broad system in and out of the city, and into the residential field.

Mr. Beattie said that the leased wires of the company were part of its spare facilities, in no sense telephone service, and not within the company's public profession or undertaking; therefore, not within the jurisdiction of the public service commission. As a matter of law, he argued, the complaint should be dismissed.

Continuing the hearing Commissioner George R. Van Namee asked Mr. Beattie if he contended that the telephone company would have the right to refuse its leased wire service to radio companies. The attorney held that the company could not be compelled to furnish that service. He admitted that the company's refusal was

not based on any substantial difference in the service requested and that given the radio companies.

Mr. Beattie stated that his company had not refused the service to any radio company, adding that while three or even more wires might be furnished the Wired Music organization, the telephone company could not enter a system the possible magnitude of which might impair telephone service.

Arthur D. Welch, assistant vice-president of the telephone company, said the demands of the music concern for wires might reach beyond the company's spare facilities and entail the construction of additional plant and line equipment which, if the music company failed, would be useless, resulting in financial losses to the telephone company.

Commissioner Van Namee asked if the same conditions would not result from an increase in telephone usage, and Mr. Welch explained that his company primarily was in the telephone business with obligations to furnish such service. The commissioner asked if the telephone company was not discriminating against the music organization, and the witness held there was no discrimination as to who used the wires, but as to the purpose for which they might be used.

The company now furnished 200 wires to the radio companies, Mr. Welch said, but did not see any possibility of an increased wire service, while the music company would require possibly thousands of wires eventually. Mr. Van Namee suggested that television might require innumerable wires, and that there might be "a sudden extension of burglar-alarm wires to protect homes." Mr. Welch said the company, in that case, would take the same attitude as toward the music organization.

The company made a plea for protection of its "managerial discretion that it might control the use to which its spare facilities are put." Mr. Welch declared that "if we lose this power of discretion we would have to furnish circuits for any other business requesting them, and it would put us in the wire-vending business."

Mr. Miller, in cross-examination of Mr. Welch, pointed out that there were 14,000 fewer telephones in use this year than last year, and asked if additional revenue would not be acceptable to the company. Mr. Welch admitted the decrease in telephone usage, but said the company would not sacrifice a principle for revenue.

Hotel Program Service Ruled as Used for Profit.

Hotels which make available to their guests in public and private rooms by means of a central receiving set, broadcasts of copyrighted musical compositions, "perform such compositions in public and for profit," within the meaning of the Copyright Act, the United States Circuit Court of Appeals for the Eighth Circuit at St. Louis, Mo., has just determined.

This ruling was made in the case of Buck, etc., v. Jewell-LaSalle Realty Co., of Kansas City, Mo., in which the United States Supreme Court, by a decision handed down on April 13, held that the transmission of broadcasts of copyrighted musical compositions by hotels to their guests constituted a "performance" of such compositions within the meaning of the Copyright Act.

The United States Supreme Court, in answering a question which had been certified to it by the Circuit Court of Appeals in these cases, did not pass upon the question of whether such hotels "perform for profit," the cases as presented not calling for a determination of this issue.

Guided by the ruling of the United States Supreme Court, the Eighth Circuit Court of Appeals has now determined, however, that such performances are public performances and for profit. The lower court, therefore, held that the defendant company, owner and operator of the LaSalle Hotel in Kansas City, Mo., could be liable for infringing the copyright of a musical composition broadcast from a radio broadcasting station and transmitted to the hotel's guests by means of a central receiving set and loudspeakers.

"It having been thus determined," the opinion of Judge Booth states, referring to the decision of the United States Supreme Court answering the certified question, "that the specified acts of the hotel proprietor constituted a performance, we are of the opinion that the record discloses that the performance was a public one and was for profit. The words 'public performance for profit' have received a liberal interpretation."

The court refers to an English case, Messager v. British Broadcasting Co., Ltd., 137 L. T. R. 810 (1927) 2 K. B. 543, in support of its holding that the broadcasting of a musical composition constitutes a public performance.

The decree of the trial court dismissing the bill for copyright infringement as to the Jewell-LaSalle Realty Co. was reversed by the Circuit Court of Appeals and the cause remanded for further proceedings consistent with its opinion and that of the United States Supreme Court.

New York Commission Orders Temporary Rates Pending Inquiry.

An investigation to determine the reasonableness of rates to be charged by the Dryden Telephone Corp. has been ordered by the New York Public Service Commission.

Pending the determination of the commission as to the rates which this company shall charge, temporary rates have been fixed by the commission to supersede rates which the company proposed to put in effect. The proposed rates have been suspended by the commission and the temporary rates made effective. The rates are applicable in the Dryden and Virgil central office districts.

The temporary rates fixed by the commission took effect August 1. They are $2 for a four-party residence line and $1.75 for a multi-party residence line and $2.50 for an individual residence line. The rates for business lines are 3.00 for an individual line, $2.50 for a four-party line and $2.25 for a muli-party line. Extension stations will be 50 cents for both residence and business service.

In ordering the investigation to determine what rates shall be charged by the company the commission suspended the rates which the company proposed on the grounds that it appeared that the proposed rates would make substantial increases over the charge for telephone service heretofore made in these districts and would yield an excessive return to the company; further that no sufficient reason for such increases had been made to appear.

The rates which the company sought to put in effect were considerably higher than those now charged and were also higher than the temporary rates which the commission has fixed and which will be effective until permanent rates are made as the result of the commission's investigation. The rates proposed by the company were suspended to and including November 28.

Nebraska Utilities Ordered to Pay Tax on Franchise Values.

The Nebraska State Board of Equalization has followed the precedent set two years ago and has ordered all public utilities to pay a tax on franchise values.

As Secretary Kloidy of the Nebraska Telephone Association, acting for all telephone companies, had previously secured a finding from the board that franchise values should be deducted from the fair value of the property when local taxation boards act, the state board's levies will not operate to increase taxation above what it was before the policy of taxing franchises was begun by the state.

The local boards have been taking, in a number of instances, the book cost of the telephone property as the basis for present value, and Mr. Kloidy has instructed all companies to make certain that the depreciation item be deducted. If depreciation is carried in a cash reserve, it is taxable only as an intangible, just as cash in the hands of an individual is taxed, the rate being a fixed low mill levy.

Not very many changes were made in the franchise values as fixed by the board, the principal companies being listed as follows: American Telephone & Telegraph Co., $60,000, an increase of $10,000; Central West Public Service Co., $25,000; Blair Telephone Co., $3,000; Crete Telephone Co., $3,000; Farmers Independent Telephone Co., of Red Cloud, $2,500.

Hamilton County Farmers Independent Telephone Association, $2,000; Lincoln Telephone & Telegraph Co., $203,000; Ne-

braska Continental Telephone Co., $35,000; Nebraska Central Telephone Co., $3,000; Northwestern Bell Telephone Co., $1,000,000; Platte Valley Telephone Corp., $30,000; Western Telephone Corp., $10,000; Southeast Nebraska Telephone Co., $5,200; Central Nebraska Telephone Co., $6,500.

Telephone Gross Receipts Tax Effective in North Carolina.

The 1931 law increasing the gross receipts tax on telephone companies from 3½ per cent to 5 per cent applies to receipts for the three-months' period ending June 30, the North Carolina Attorney General, Dennis Brummitt, has advised Commissioner of Revenue Maxwell.

Section 207 of the 1931 Revenue Act which made the increase in question was in force on July 1, the opinion pointed out.

"Receipts for the three preceding months were simply used as a base for the measurement of the tax due with report required to be made within 30 days after July 1," it says. "This could be done, although no tax had been imposed at any period preceding July 1. It is equally clear that it can be done under the new act and the tax collected at the rate of 5 per cent."

Wisconsin Company's Application to Issue Stock Denied.

In conformity with the ruling made in the Mondovi Telephone Co. case, which appeared in TELEPHONY of June 20, the Wisconsin Public Service Commission on July 9 refused the Community Telephone Co. of Black River Falls, Wis., a permit to issue $35,000 in common stock and $45,000 in bonds.

In the Mondovi company case the commission held that contributions by consumers could not be used as part of the valuation for rate-making purposes. The Community Telephone Co. sought a permit to issue the stocks and bonds in order to acquire the Ettrick Telephone Co., and the Lincoln Farmers Telephone Co.

Practically all the stock of the two latter firms is owned by the Community Telephone Co., and the elimination of the two corporate entities would permit a saving in accounting and other costs. The commission said "the wide discrepancy between book costs and engineering appraisals is not supported on the record by any convincing explanations."

Possible explanations for this, the commission said, were that contributions of labor or material had been made by subscribers or stockholders, that the book records were not accurate and that the present value of assets exceeds the original cost of the properties.

Although there is no evidence of contributions, it is possible that they have been received, the commission stated. It is impossible to determine to what extent new additions to the property were financed out of the operating revenues and the use of the depreciation reserve.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

July 30: The Northwestern Bell Telephone Co. applied for authority to purchase the properties of the Tri-State Consolidated Telephone Co., which operates the telephone exchange at St. Paul, Minn., for the sum of $19,510,101.

July 30: The Northwestern Bell Telephone Co. applied for permission to purchase for $1,078,000, certain through toll lines of the Dakota Central Telephone Co., Aberdeen, S. D., which operates a telephone service in North and South Dakota. (Finance Docket No. 8924.)

ARKANSAS.

July 17: Southwestern States Telephone Co., of Little Rock, Ark., and Dallas, Texas, authorized to issue and sell $1,000,000 of 6 per cent bonds to be dated September 1, 1931.

CALIFORNIA.

July 27: A. V. Prouty, Gladys Kallmeyer, W. E. Prouty and D. L. Prouty, executors of the will of C. C. Prouty, deceased, applied for authority to discontinue operation of a public telephone line at Ione Valley, Amador county, formerly operated by C. C. Prouty.

July 31: Columbia Utilities Co. of California, Ltd., applied for a certificate of public convenience and necessity to construct a telephone and telegraph toll line between Tule Lake, Siskiyou county, and the Shaw-Bertram Lumber Co. logging camp, and toll stations at the ranch of Liskey Bros., and the construction camps of A. Guthrie & Co. The proposed toll stations to be established on this line are situated along the new Great Northern Railway now under construction between Klamath Falls, Ore., and Bieber, Calif. These stations are at present without telephone or telegraph service of any kind.

ILLINOIS.

July 7: Schedule I. C. C. No. 1 of the Philo Telephone Co. filed applicable to Philo; adds 25-cent penalty and files reconnection charges and service connection charges, effective July 22, 1931. No action was taken by the commission.

July 7: Order approved suspending until November 21 proposed rates for service in Campus, county of Livingston, stated in rate schedule I. C. C. No. 2 of the Illinois Commercial Telephone Co.

July 7: Tolono Telephone Co.'s I. C. C. No. 2 schedule filed applicable to Tolono, which adds a 25-cent penalty and files reconnection and service connection charge, effective July 22, 1931. No action was taken by the commission.

July 7: Petition of the Greenup Telephone Co. asking for a period of suspending charges for moves and changes and service connection charges, as provided for in general order 67, extended to September 1.

July 15: Order approving traffic agreement between the Illinois Commercial Telephone Co. and the Greenup Telephone Co. covering conection of toll lines and the joint handling of toll messages.

July 21: Order approved authorizing the Champaign County Telephone Co. to purchase and acquire, and John Carson to sell as of June 1, 1931, free and clear of all indebtedness as of that date, the entire property or properties owned by John Carson located in the villages of Philo and Tolono and vicinities in Champaign county, heretofore operated by John Carson under the name of the Philo Telephone Co. and the Tolono Telephone Co., for the consideration of the sum of $35,000.

The order also granted to the Champaign County Telephone Co. a certificate of convenience and necessity authorizing it to own, construct, maintain and operate telephone property and transact a public utility telephone business in the villages of Philo and Tolono and vicinities, in the territory now served by the existing telephone property to be acquired under the terms of this order.

The Champaign County Telephone Co. was authorized to issue and sell or dispose of $25,000 aggregate par amount of its 6 per cent cumulative preferred capital stock, consisting of 250 shares of the par value of $100 per share, and 1,000 shares of its common capital stock without par value.

July 21: Order approved authorizing and permitting the Illinois Commercial Telephone Co. to withdraw its schedules of rates for service in Campus, Livingston county, designated as I. C. C. No. 2, and dismissing the cause.

July 22: Illinois Bell Telephone Co.'s supplement No. 1, page 2 to I. C. C. 3, change in franchise consideration clause, eliminating discount in telephone rate to the city, and substituting therefor three free telephones to be furnished to the city, effective August 3, 1931, applicable to the city of Vandalia, filed. No action taken by commission.

July 22; Illinois Commercial Telephone Co. rate schedules applying to Ullin, Teutopolis, Evansville, Waterman, Hinckley, Coulterville, Thawville, Roberts, Paxton, Melvin, Buckley, Capron and Stronghurst, standardizes various rules and service connection charges and penalties effective July 20, 1931, filed and no action taken.

July 22: Application of Assumption Mutual Telephone Co. for authority to issue $20,000 of its first mortgage bonds, reopened for the purpose of taking further testimony and set for immediate hearing.

September 14: Continued hearing on proposed advance in rates for service in Chatsworth by the Illinois Commercial Telephone Co.

INDIANA.

July 17: The petition of the Indiana Commercial Telephone Corp. for authority to issue securities and to purchase certain Indiana telephone companies, dismissed at the request of the petitioner.

The petition was originally denied by the commission in March but in May arguments on a petition for rehearing were heard and on June 19 the commission sustained the motion for a rehearing.

July 17: Order issued authorizing the Southern Indiana Telephone Co., of Aurora, to issue 50 shares of common stock and 100 shares of preferred stock.

It is stated the stock is being issued in connection with the company's program of extensions and improvements of its property. Since May 1, 1927, over $40,000 have been expended in new telephone plant and only a portion of this amount has been financed permanently.

July 30: Hearing before Judge Jere West on the petition of the Princeton Telephone Co. for permission to establish a 10-cent toll for conversations over the Francisco Telephone Co. lines.

August 3: Hearing in Indianapolis on joint application of the Rushville Telephone Corp. for authority to acquire and of the Rushville Co-operative Telephone Co. for authority to sell, the property of the Rushville corporation; also for an order from the commission authorizing the

(*Please turn to page* 44.)

LONG

"Our LONG DISTANCE telephone bill is one of the best investments we make"

TOLL SERVICE AND OTHER CHARGES
DATE
PLACE CALLED
AMOUNT
CODE
Feb. 25 DES MOINES 1 10
SEATTLE 8 50 P
ATLANTA 5 50
26 MILWAUKEE 1 40
NEW YORK 7 75
OMAHA 1 40 P
27 DETROIT 2 35
NEW YORK 3 75
STAMFORD 3 75
YOUNGSTOWN 2 75 P
Mar. 3 SAN FRANCISCO 7 50
6 PHILADELPHIA 3 75
9 CINCINNATI 2 35
12 PITTSBURGH 3 00
16 ROCHESTER 50
55
CUSTOMER'S RECORD OF MONTHLY TELEPHONE USAGE
NAME | DEPT. | PURPOSE
Smith | Exec. | Administrative matters. Des Moines plant supt.
Palmer | Sales | Closed $28,000 order. Crosman & Co.
Johnstone | Eng. | Discussed details new Atlanta branch.
Gerhardt | Credit | Obtained payment $3000 Blank Co. acc't. Overdue 60 days.
Frey | Sales | Concluded $65,000 Coleman contract.
Goodrich | Empl. | Hired 6 skilled workmen for immediate duty.
Egan | Pchs. | Got quotations from 3 firms on Unit 38A5. Saved $5200.
St. George | Exec. | Instructions to San Francisco branch manager.
Howard | Adv. | Authorized immediate insertion newspaper advertisement.

THE TELEPHONE brings marked economy in the transaction of inter-city business. Saves valuable time for executives. Speeds production and deliveries. Straightens out misunderstandings. Simplifies operations.

A leading flour mill company uses Long Distance in all phases of its business. Executives at the home office direct branches and mills in various parts of the country chiefly by daily telephone calls. They maintain personal contact regularly with out-of-town customers by telephone. Speaking of the firm's Long Distance bill, an official says: "We think it is one of the best investments we make."

A textile company was in the market for goods of a certain kind. Prices quoted were not satisfactory. The purchasing agent telephoned three different cities. With the information gained, he saved his firm $6000 on one order.

A large Ohio specialty company, through its sales manager, closed a $45,000 deal during a three-minute telephone call to Kansas City. Cost of the call, $3.

Inter-city calls cost little, yield big. Typical station-to-station day rates: New York to Boston, $1. Pittsburgh to Indianapolis, $1.50. Seattle to Omaha, $5. Evening and night rates, still lower. Get things done by telephone . . . *Quick* . . . *Inexpensive* . . . *Resultful*.

Ad

DISTANCE

Presented as a business tool

IN THE light of current economic conditions, long distance telephone service assumes a new significance. Men who once employed it only in emergencies are discovering that it is an effective every-day business tool. They're using it to cut selling costs, keep contacts alive, open new territories...in scores of different ways.

That *all* business men may know the value of Long Distance and apply it profitably to their own affairs, advertisements like the one on the opposite page are appearing in many of the publications that business men read.

Based upon the actual experiences of representative concerns, these advertisements present long distance telephone service as a modern business investment. Simple, vigorous illustrations make them attractive. Crisp captions and copy make them readable. Accurate facts and figures make them convincing.

Advertising of this character benefits business generally by the broad service that it offers. And it strengthens the telephone industry particularly — both Bell and connecting company — by stimulating long distance traffic.

Advertisement of the American Telephone and Telegraph Company

Dial Installation in Manchester, England

History of Telephone Development in Manchester, England—Detailed Description of Strowger Automatic Equipment Recently Installed in Blackfriars Exchange; One Feature Is Automatic Testing of Equipment to Locate Defects

By J. W. Catchpole,
Automatic Telephone Mfg. Co., Liverpool, England

In Doomsday Book, Manchester, Salford, Rochdale, and Radcliffe are the only places named in southeast Lancashire, England, a district now intensively populated and a great industrial area.

In 1301 Manchester received a charter of manorial liberties and privileges from its baron, Thomas Gresley, a descendant of one to whom the manor had been given by Roger of Poictou, who was created by William the Conqueror lord of all the land between the rivers Mersey and Ribble.

The manorial rights subsequently passed, through the De la Warrs, to Sir Reginald West and the West family in 1579 sold the rights for £3,000 to John Lacy, who in 1596 resold them to Sir Nicholas Mosley, in whose possession and that of his descendants they remained until 1845, when they were purchased by the Municipality for £200,000.

Manchester's association with the textile industry dates back to the 13th century, when fulling mills were at work in the district, whilst documentary evidence exists to show that woolen manufacturers were carried on in Ancoats at that period, although cotton, now its staple industry, was not introduced until the 17th century.

Today, Manchester with the adjoining Borough of Salford, boasts a population of over 1,000,000 and, therefore, calls for a telephone service comparable with that of the largest city networks such as London. In point of fact, the new Strowger automatic telephone service, which was cut-over at 1:00 p. m. on Saturday, June 13, is equipped on the Strowger director principle, the first provincial area to be modeled on the London plan where this latest application of Strowger working to metropolitan networks has already proved so successful.

Telephone House, Chapel Street, Salford, Housing Blackfriars, Manchester, Automatic Telephone Exchange and Automanual Equipment.

As in the case of London the new Blackfriars exchange was equipped to the order of the British Post Office by Automatic Telephone Mfg. Co., Ltd., Strowger works, Liverpool, sponsors of the system and originators of the director principle.

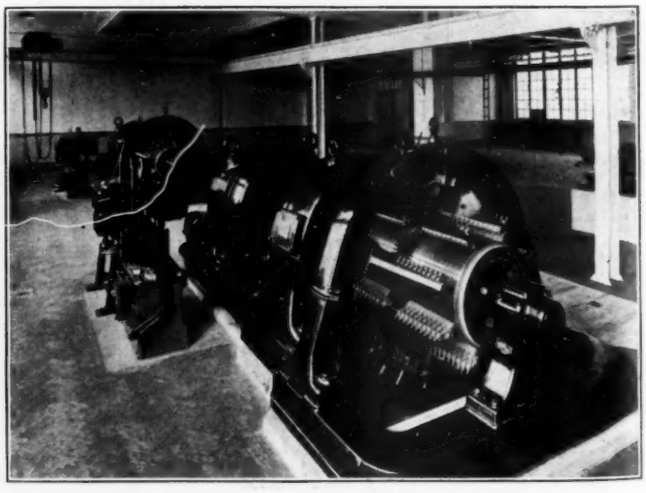
Curiously enough the main Manchester exchange is actually inside the Salford boundary, being located in Chapel street. The building, known as Telephone House, is of considerable magnitude and will ultimately house three separate exchanges, each of 10,000 lines capacity. The present exchange is known as Blackfriars; the remaining two will be named Deansgate and Victoria respectively.

The auto-manual equipment, which facilitates interconnection between automatic and manual subscribers during the transition period, is accommodated on the sixth and seventh floors, the latter being the largest switchroom of its kind in the world.

The auto-manual boards which were also manufactured and installed by Automatic Telephone Mfg. Co., Ltd., have been in service for some months, and will be still further extended as a centralized inquiry and information exchange, as well as a routing center for telephone traffic in and through the Manchester area.

Telephonically considered, Manchester is the principal junction center of the industrial North, and formerly the Central exchange formed the connecting link between the various exchanges in and around the city. This work is being transferred to the new toll switchboard, also located on the seventh floor alongside the auto-manual equipment.

As may be imagined, the diversion of subscribers' lines, and junctions to the new building has been a task of considerable magnitude, involving the construction of duct routes through some of the busiest and most congested thoroughfares.



Battery Room in Blackfriars Strowger Automatic Telephone Exchange, Manchester, England—View Showing the Power Plant.

Exide-Ironclad Battery, Type BI-5

Dependable . . . Compact . . . Economical . . .

THE Exide-Ironclad Battery is a newcomer in the telephone field. It was especially designed to fully meet the requirements of P.B.X. service.

Compactly built, it delivers the maximum of power in a minimum amount of space. It assures absolute dependability. Its useful life is greatly prolonged because of the unusual slotted tube construction of the Exide-Ironclad positive plate.

The initial cost of an Exide-Ironclad Battery for P.B.X. service is moderate. The operating and maintenance costs are low.

Positive plate of Exide Ironclad Battery in which active material is retained in slotted rubber tubes, thus prolonging life of battery.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
World's Largest Manufacturers of Storage Batteries for Every Purpose.

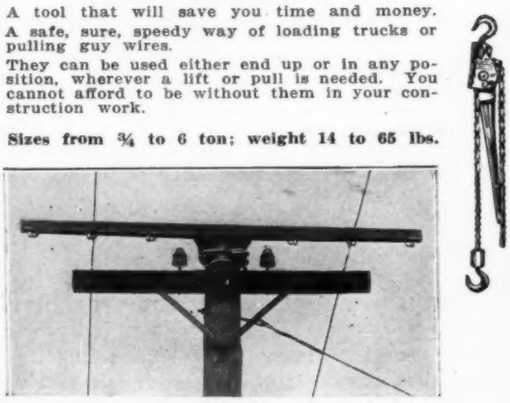
COFFING HOISTS

"THE UNIVERSAL TOOLS"

A tool that will save you time and money. A safe, sure, speedy way of loading trucks or pulling guy wires.

They can be used either end up or in any position, wherever a lift or pull is needed. You cannot afford to be without them in your construction work.

Sizes from ¾ to 6 ton; weight 14 to 65 lbs.



TEMPORARY CROSS ARM

A Certified Malleable Iron clamp and locking handle enable the lineman to securely fasten the Temporary Cross Arm to the pole while changing over the wires. Fine adjustment on the clamp is obtained by means of a bolt on one end of the chain. The clamp is of the proper height to provide clearance over the top of the insulators on the cross arm being changed.

COFFING HOIST CO.
DANVILLE, ILLINOIS

TELERING

The SUPER-RINGING MACHINE

Why Hesitate Longer? Make us prove our claims. If we fail, your money back including transportation charges. Isn't that a fair proposition?

Low first cost
Negligible Operating Expense
No Radio Interference

Trial Orders Invited

Operated by Commercial Alternating Current

Price $44.00—F. O. B. ELYRIA
It Pays for Itself

Sold by Leading Telephone Distributors

TELKOR, INC., ELYRIA, OHIO
(Write for booklet.)

Selector Trunk Boards in Blackfriars Strowger Automatic Telephone Exchange, Manchester, England.

Entering the building via Victoria Bridge and Chapel street is a nest of 120 separate ducts, each capable of accommodating a 1,200-pair cable. The Blackfriars street route comprises 126 ducts, whilst 250 ducts actually enter the new exchange building.

The total length of single duct provided, amounts to 246 miles, and 36 miles of cable comprising 26,000 miles of single conductor have been laid to cater for present and future requirements in the development and extension of Manchester's automatic telephone system.

In many instances ducts and manholes had to be constructed at depths of over 30 feet below the roadway, and, incidentally, the Pendleton fault, to which some attribute the recent earthquake in Great Britain, was located in the rock under Deansgate and recorded by the geological department.

Due to its extent and the number of separate exchanges—37 when the scheme is complete—the Manchester area is as already intimated, equipped for Strowger director working. Like London, it is a seven-digit system embodying a three-letter exchange code for routing calls to the required destination prior to selecting the actual number of the wanted subscriber. Thus, if an Ardwick subscriber wants a Blackfriars number he first dials BLA,

Line-Switch Units in Blackfriars Automatic Telephone Exchange.

followed by the four digits representing the wanted number in that exchange.

The director, a combination of standard Strowger components, responds to the dialing of the three letters, BLA, and automatically extends the calling subscriber's line to Blackfriars exchange, selecting in the process a chain of switches in that exchange which will take up the digits of the number subsequently dialed and complete the connection.

Automatic to manual traffic is handled via coder call indicator positions in the manual exchanges. The automatic subscriber dials as usual the first three letters routing his call to its destination, and the four subsequent numerical digits appearing in illuminated stencil on an opaque screen before an operator at a switchboard at the distant exchange.

This operator is furnished with a number of single cords and plugs, one of which she selects and inserts in the jack of the wanted subscriber's line, thereby completing the connection, applying ringing current, and at the same time clearing the screen ready for the reception of the next number wanted.

Conversely, if a manual subscriber desires connection with an automatic subscriber he instructs his local operator in the usual manner. She transfers the call to a key-sending position, the operator at which transmits the call via the Strowger automatic equipment by pressing successively the corresponding keys.

Such inter-exchange calls between the old and the new systems are considerably accelerated by the auto-manual processes just described.

The Strowger automatic equipment comprising the Blackfriars exchange is located on the first and second floors of the new building. It consists in the main of: 97 rotary line-switch units, 13 first code selector trunk boards, 11 second code selector trunk boards, two first tandem selector trunk boards, 9 first numerical selector trunk boards, 10 second numerical selector trunk boards, one third numerical selector trunk board, one "A" digit selector trunk board, 42 single-sided director racks, seven coder racks, five direct C.C.I. repeater and coder rotary line-switch racks, two tandem C.C.I. repeater and coder rotary line-switch racks, six 11/20 P.B.X. final selector racks, two 21/48 P.B.X. final selector racks, and one trunk and trunk offering distributor rack.

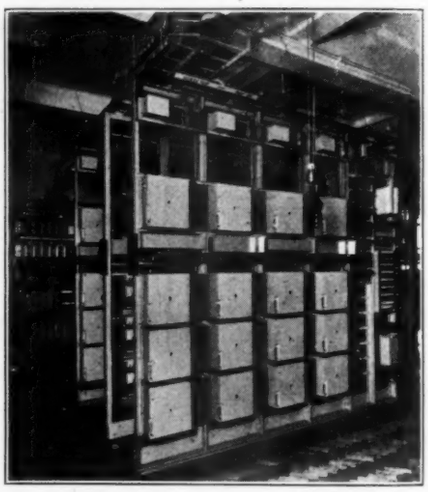
In addition there are two main distributing frames on the ground floor capable of accommodating 40,000 pairs of conductors for trunks, junctions and subscribers' circuits entering the exchange.

It will be appreciated that so large an exchange consumes considerable current, both to operate the automatic equipment and energize subscribers' transmitters.

The exchange takes its current from large Alton storage batteries on the fifth floor, made by the Alton Battery Co., Alton, Hants. Each battery comprises 25 cells and is of 10,000 ampere-hour capacity, individual cells weighing approximately two tons each. The battery is capable of an output of 2,000 amperes, and is in duplicate, one set being on charge whilst the other is in service.

The Crompton-Parkinson charging motor-generators are the largest installed in Great Britain for telephone service. Each has an output of 3,200 amperes and runs off the corporation supply mains.

To render the service immune from breakdown, even in the event of failure in the electricity supply, an emergency semi-Diesel oil engine generating set is installed in the basement, and has an output of 1,600



Director Racks in the Blackfriars Automatic Telephone Exchange.

amperes at 57 volts. It will be realized, therefore, that Manchester's telephone service will remain unaffected and continue to function even if her streets are dark and her factories at a standstill through electricity supply failure.

Reliable as Strowger automatic telephone exchange equipment has proved itself over many years' service in all parts of the world, nothing is left to chance. There is an elaborate system of supervisory signals, by means of which audible and visual indications are given on each floor of any abnormal condition, enabling the maintenance staff to deal promptly with any emergency and thus avoid interruption of the service.

In addition, facilities are provided whereby supervisory alarm signals may ultimately be extended from each of the present and future Strowger automatic exchanges in the area to the Chapel street building, during week-ends and holidays

SPEED, POWER, unmatched Traction!
that's why the FWD is most flexible of trucks . . . adaptable to your work

Public Utilities Companies are using Four Wheel Drive Trucks in large fleets because they handle every trucking assignment with the same dependability and economy of operation . . . because they have ample speed, and power, and traction, unmatched by ordinary trucks.

The FWD Utility Truck is exceptionally powerful — it puts all of the power developed to actual use — it drives and brakes on all four wheels — it pulls through the toughest of "road-going" — up and down hills — in and out of ditches — a powerful, economical, all-purpose utility truck, different in principle. *Write Dept. G.*

The Four Wheel Drive Auto Company
Clintonville, Wis. **Canadian Factory: Kitchener, Ont.**

FWD

BACKED BY NATION-WIDE SERVICE

LEICH MAGNETO TELEPHONES
Wall—Desk—Residence

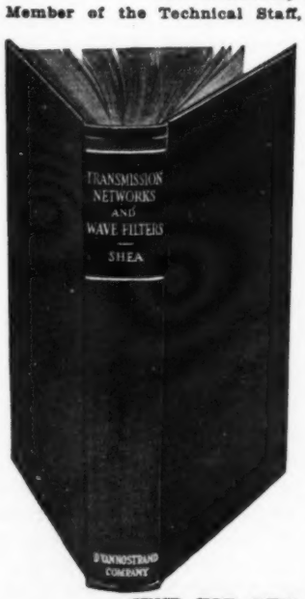
No. 105-A

Rugged construction — positive action — efficient operation. Wired for any circuit. Equipped with straight line or harmonic ringers, any size generators.

A telephone which will meet all requirements.

LEICH ELECTRIC CO.
Genoa, Ill.

TRANSMISSION NETWORKS AND WAVE FILTERS
By
T. E. SHEA, B. S., M. S.
Member of the Technical Staff, Bell Telephone Laboratories



The calculation and design of telephone networks and wave filters are fully presented in this book, written by Mr. T. E. Shea of Bell Telephone Laboratories. It embodies the most recent developments in this field as well as the standard practice.

"The Telephone Equipment of 1929," "The New Science Telephony," "Transmission Networks and Wave Filters" and "Radio Broadcasting Engineering" are a few of the subjects capably discussed in this valuable book.

SEND FOR THIS BOOK TODAY!
We recommend it as of great interest and value to every telephone man. 512 pages—6¼ x 9¼—Cloth—Illustrated—$6.50.

TELEPHONY PUBLISHING CORPORATION
608 S. Dearborn St. **Chicago, Ill.**
Telephone—Wabash 8604

The Service-Hour Cost is *Less*

YOU BUY telephone batteries for just one purpose—to give satisfactory service for a long time. Short service means high cost—long service, low cost. Ray-O-Vac Telephone Batteries cost less because they deliver more service—many hours more than other cells. This is proved not only by competitive tests conducted in accordance with U. S. Government standards, but by users' records as well. Moreover, there's an appreciable saving in service costs. Standardize on the Ray-O-Vac Telephone Battery—the cell with the low service-hour cost.

FRENCH BATTERY COMPANY
Madison, Wisconsin
General Sales Offices:
20 North Wacker Drive, Chicago, Illinois
Makers also of Flashlight Batteries, Rotomatic and Standard Flashlights and Electric Lanterns

RAY-O-VAC

and periods during which these exchanges may be left unattended.

Another interesting feature which also contributes to the reliability factor is the automatic and systematic testing of the various Strowger components by what are known as "routiners."

This apparatus continuously connects itself to the several units of the exchange plant, and applies a series of tests based on more drastic conditions than those obtaining in actual service. Having completed one switch or component, it passes on to the next, and so on until the entire series have been routined.

Should a defect be encountered, the apparatus ceases to function and a lamp signal challenges the attention of the maintenance officer, indicating the position and nature of the trouble.

The Strowger equipment at Blackfriars exchange was installed by the manufacturers, Automatic Telephone Mfg. Co., Ltd., Strowger works, Liverpool, under the personal supervision of T. E. Herbert, Post Office superintending engineer for the South Lancashire district, assisted by Mr. Escott for internal, and Mr. Field for external construction and line equipment. Great credit is due to these gentlemen for the highly successful issue of their labors, whereby Manchester now boasts the nucleus of a Strowger automatic dial telephone service comparable with that of Greater London.

The official cutover took place precisely at 1:00 p. m. on Saturday, June 13, in the presence of a small gathering of interested spectators, who were subsequently shown over the building by T. E. Herbert and his staff.

The change, which involved an initial 3,000 subscribers, was effected in a few moments and was completed satisfactorily and without a hitch.

New Telephone Exchange Under Construction at Willard, Ohio.

Plans have been completed and work is under way on the construction of a new exchange building at Willard, Ohio, by the Northern Ohio Telephone Co. It is expected that the building will be completed and new central office equipment installed by November of this year. The cost of the building and equipment is estimated at $70,000.

The building will be located at 16 Emerald street, with a frontage of 50 and a depth of 150 feet. With an alley on one side as well as the rear, the building will be accessible from three sides. The site selected for the new exchange is in almost the exact wire center of the city.

The building will be constructed of wire cut brick, with steel framework, and will be fireproof throughout. It will be set back from the street to permit landscaping and terracing of the lot.

According to the architect's plans, a large commercial office will open directly off the front lobby and will provide an attractive and conveniently-arranged room for the transaction of business with the company's customers. A manager's office and rooms for the switchboard and auxiliary equipment complete the main building, which will be one story in height and about 34 ft. wide by 38 ft. long.

Connected to the main building at the rear will be a combination brick warehouse and three-car garage for housing construction material, supplies and motor equipment. In the basement will be located the repair room, cable vault, heating plant and accommodations for the construction and repair crews.

The building will be heated by a hot water system.

The outside plant forces of the Northern Ohio company have been at work recently on the task of rearranging and adding to the present cable facilities of the Willard exchange. Additional underground cable is being installed to provide underground entrance to the new building for 1,400 pairs of wires.

AFRAID OF YOUR SHADOW?

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

When a child, a story I delighted in reading, and looking at the pictures again and again, was that of a little boy named Miltidies Peterkin Paul, who thought he was being pursued by a spook one dark night. How he tried to elude the terrifying spectre which stalked grimly behind, before, or at his side; now crouching low on the ground as though about to spring upon him; again stretching itself into a long, lean, evil-looking demon as high as the treetops.

No matter how fast he ran, what corners he suddenly turned, or whether he took to the middle of the road, there was no escaping it until he finally reached home and his mother's arms. Poor little Miltidies Peterkin Paul, afraid of his own shadow, I used to think.

The boy and girl of Miltidies Peterkin Paul's day have long since grown to manhood and womanhood, even as you and I. But we have always been pursued by spectres of one kind or another. Spectres that never allow us to be alone for one minute of our conscious lives.

There is one of these spectres rather well known to many of us; one that we fear and try to elude. Unlike Miltidies Peterkin Paul, we could if we would, but we are afraid. And so this spectre causes us to make decisions whether we like them or not; to deceive folks into believing we are better off than we are; to buy such things as clothes, cars; take expensive vacation journeys; and what not, that we do not need and cannot afford, for no better reason than to "keep up with the Joneses."

"What-will-people-say" is the name of this tormenting spectre which shadows every move we make; weakens our resistance with his sly, insinuating ridicule. How can we get rid of him? By being what people like best in one another, and that is: *Being ourself,* no matter how humble.

MORAL: "Make-believing" may get us *by,* but not *far.* We see through a lot of the make-believing in other folks. Are we any more able to fool others than they are to fool us?

Answers to Traffic Questions Presented on Page 19.

1. "Room telephone da" is not a chargeable report. The subsequent attempt time is one hour from the time the report was received.
2. We are instructed to ring a full two-second ring. Ringing a short jerky ring on a toll circuit frequently fails to operate the relays at the distant office, meaning that the distant operator does not receive our signal. This procedure is a waste of circuit time, a waste of operator's time, and delays the calling party's call. However, it is not expected that an operator should ring four, five or six seconds on a toll circuit. This delays the answer at the called station and frequently rings the distant operator in the ear. If you are having this difficulty with any particular office, refer the case to your supervisor or chief operator so that this condition can be adjusted.
3. In passing a collect call, prefix the word "collect" to your order for the called number or address name. Acknowledge the repetition of the word "collect" with "right."
4. When the toll operator asks you to hold the trunk and the calling number, you are permitted to cut out of the connection and proceed with other work. Failure to do so may result in your getting a ring in the ear as the toll operator will not expect you to remain on the trunk.
5. The practice of encircling your operating number when CLR service is given on a call has been discontinued.

It is, therefore, generally advisable to remove protectors, drop wire and ground rod from residences where there is little chance of selling telephone service within a reasonable time.

A tool for removing ground rods with a minimum effort can be made by any blacksmith at a small cost. Constructional details of this tool are shown in Fig. 1. It is operated by holding the handle up, attaching the chain around the rod and then pressing down on the handle. Six-foot rods can be easily and quickly pulled up by this method.

Storage Batteries; Capacity Tests.

It is desirable that quarterly capacity tests be made on central office batteries which are charged on a "trickle" or "full float" basis. The purpose of these periodic tests is to insure that the storage capacity of the battery has not fallen off to such an extent that they would not have ample reserve capacity to carry the central office load for several hours in the event of a power failure.

These tests are usually made during the first week in January, April, July and October, and should be started in the forenoon. The test is made by stopping the charge and letting the battery carry the entire exchange load. Hourly gravity readings are taken of each cell. The test is continued until the specific gravity of the pilot cell has been lowered ¾ths of its entire discharge rate, or until the battery has carried the entire daytime load of the exchange for at least six hours.

A comparison of the gravity readings of the various cells will readily show up cells which have low capacity and which have insufficient reserve to carry the exchange load for several hours in the event of power failure.

The average rate of current discharge can also be used to check the ampere-hour capacity with its theoretical capacity.

At the completion of the tests the battery should be immediately placed back on charge and the charging rate adjusted so that the batteries are given an overcharge, after which the normal charging rate should be resumed.

Magneto Switchboard Drop Maintenance.

Magneto switchboard drops should be given a cleaning and adjustment at least once each year. The armature should be adjusted so as to prevent binding, and yet not have unnecessary side play. The armature pivots should be cleaned with carbon tetrachloride, and the lock nuts tightened.

On drops, such as the Stromberg-Carlson, the frame around the shutter should be carefully centered to keep the shutter from rubbing or binding.

The mounting screws holding the drop to the face of the board should be tightened.

If the drop is removed from the board, the tip and ring springs and sleeve thimble should be examined for signs of excessive wear, and replaced if necessary.

The drop winding should be checked with an ohmmeter to insure that none of the turns is short-circuited.

Cable Maintenance.

General.

Cable plant properly constructed and maintained will greatly reduce service interruptions on local exchange plant. Conversely, a poorly-constructed and inadequately maintained cable plant will not only cause service interruptions but will greatly lower the average grade of service rendered due to crosstalk, noise and other troubles that result from leaky insulation.

A few blocks of cable which is badly crystallized will cause more trouble than several miles of heavy, open-wire lead. Many telephone men think that their troubles will be over when they replace open wire with cable, but this is only true if they recognize that cable requires periodic attention the same as other types of outside plant.

Results of Inadequate Maintenance.

The successful operation of paper-insulated telephone cable hinges on the ability of the lead sheath to keep out moisture. This sheath is in reality a continuous lead pipe; and a pin hole at any place in its length will usually result in service interruption to a large number of telephones.

Inadequate maintenance or improper construction methods result in the lead sheath cracking, or an opening being caused from wear at supporting joints. Other conditions which may cause trouble are defective wiped joints, leaky terminals and sheath holes due to lightning discharges or crosses between cable and power lines.

The trouble due to sheath openings may vary widely. For example, a hole almost invisible to the naked eye will, under certain conditions, permit several pints of water to enter a cable; whereas, a complete sheath break under the same conditions will often not result in a single wet pair.

Experienced cable men are often able to predict the type of sheath opening which is causing trouble, by the nature of the conductor faults experienced. For instance, if cable pairs begin to go bad several days after a rain, they are inclined to suspect a defective wiped joint. This assumption is based on the fact that it takes several days for moisture to break down the insulation of a splice due to the paraffin on the paper insulation.

Wet pairs which show up during a heavy rain and which clear up shortly after it has stopped raining, usually indicate a complete sheath break near the middle of a span.

While the ability to locate the source of cable trouble is a necessary quality for anyone responsible for cable plant, there is greater need for an understanding of cable maintenance methods which will eliminate sheath breaks.

Causes of Sheath Break.

Sheath damage on aerial cable may result from many different causes, some of which are:

1. Ring cuts due to type of ring used, or to excessive vibration.

2. Crystallization due to vibration from trees, bridges, or too much tension in the messenger strand.
3. Cracks and breaks due to tree limbs.
4. Holes caused by squirrels gnawing the lead of the cable sheath.
5. Gaff holes due to carelessness of power and telephone linemen in climbing with spurs.
6. Holes due to lightning or power discharges from conductors to sheath.
7. Holes and ring burns due to power line crosses with the supporting strand or sheath.

Much of the early cable sheath which was placed by Independent companies was of the "pure lead" variety. Pure lead cable sheath is unsuited for aerial use, and the sheath of the smaller sizes will crystallize if subjected to even slight vibration. This condition is eliminated in present-day cable sheath by making it of 99 per cent lead and 1 per cent antimony.

Unless exceptionally good care is taken of a pure lead sheath cable plant it will in a short time get in such condition as to make replacement of the cable necessary in various sections of the lead.

Cable Maintenance Routine.

Aerial cable should be given a thorough inspection and conditioning once each year. In the average small and medium-size Independent exchange such an inspection can be made in a few days.

This inspection should be made by walking over the route of the cable and observing the sheath closely for evidences

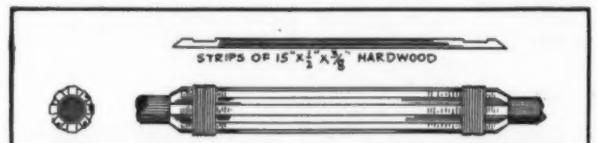


FIG. 1. TREE GUARD FOR MECHANICAL PROTECTION OF AERIAL CABLES.

of ring cuts, cracks, breaks, or other defects. Although the inspector is on foot, he should be accompanied by a light repair car and helper.

Trees should be trimmed so that they cannot touch the supporting strand or cable sheath. Trees cause a large portion of aerial cable trouble, as their constant vibration will quickly crystallize and break the cable sheath. The sheath should be examined carefully at locations where trees have grown into the lead. Fig. 1 shows method of protecting the cable sheath where the trees cannot be trimmed to provide clearances.

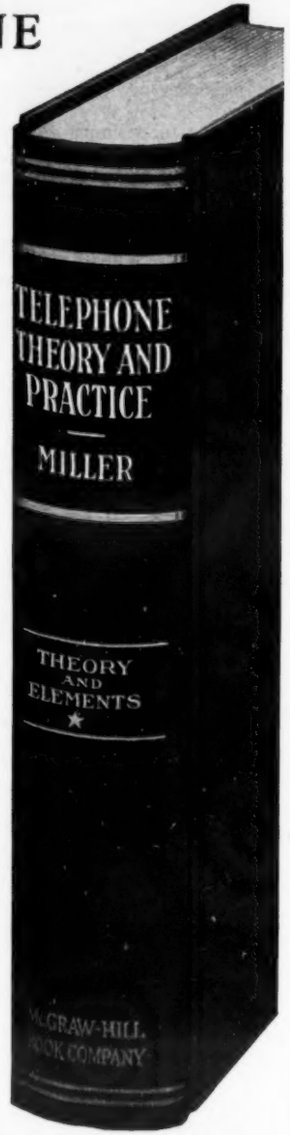
Excessive slack in the messenger should be eliminated by loosening the supporting clamp at each pole and pulling up the messenger strand at the nearest dead-end point.

TELEPHONE THEORY and PRACTICE

Theory and Elements

by **Kempster B. Miller**

Fellow, American Institute of Electrical Engineers; Member, Western Society of Engineers; Author of American Telephone Practice, 1904, and Joint Author of Telephony, 1912.



Here is a book that comprehensively covers those introductory and theoretical elements of telephony needed for study and reference by workers in all stages of the profession. It is written by an authority; a man connected with practical telephony for more than thirty-five years. Although the first volume of a three-volume series, this book, Theory and Elements, represents an independent, complete and up-to-date treatment of its subject. A thorough groundwork in the background and principles of telephony is given, which will serve:

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2. The more advanced telephone worker who is specializing in some particular phase of the industry and who may wish to see more clearly how his job is related to the rest of the business.
3. The general technical reader who is interested in the broad phases and general workings of the industry.
4. The college student who is interested in underlying theory.

Throughout, the book is written in understandable language, with mathematical applications reduced to a negligible minimum. We recommend this book of great interest and value to every telephone man. 492 pages, 6x9; 272 illustrations; $5.00.

Telephony Publishing Corporation

Telephone Wabash 8604

608 South Dearborn Street Chicago

MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices not previously published.

SWITCHBOARDS (P-A-X's)

The Strowger Type 31 P-A-X provides facilities for handling trunk calls at any station, thus eliminating the attendant's cabinet. It is described in an illustrated circular, which has just come off the press. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

Notices previously published.

RECTIFIERS

Bulletin with prices is available on a new Power Filter Unit, which converts Alternating Current into pure, non-pulsating, humless, Direct Current for use on telephones, sound-on-film, public address systems, inter-communicating systems, clock and signal systems, magnetic chuck operation and elevator control. The unit has innumerable applications where direct current is required. **The Power Filter Division, Square D Company, 6060 Rivard St., Detroit, Mich.**

RINGING CONVERTERS

Bulletin No. 150 entitled "Leich Ringing Converters" describes and illustrates converter equipment for producing ringing current; this includes harmonic converters, ringing frequency converters and ringing converters with charger equipment. **Leich Electric Co., Genoa, Ill.**

SALES CAMPAIGNS

Two Small Folders specially designed for extension sales campaigns are now available. They will be furnished complimentary all ready for insertion with your monthly bills—they can be obtained in any quantity required. **American Electric Company, Incorporated, State & 61th Streets, Chicago, Illinois.**

SWITCHBOARDS

Twelve-page bulletin No. 181, describing Masterbuilt Switchboard assembly and operation. Description contains complete details regarding the 3 sizes of Masterbuilt boards—the 6—800 the 1,600 and the 4,200. **Kellogg Switchboard & Supply Co., Chicago, Illinois.**

TELEPHONES

Bulletin 1034, a completely revised and enlarged catalog of Strowger Dial Telephones and Telephone Parts, both for central battery and for local battery service. Among the new items included are pay stations, the Strowger Telephone Call Recorder, and the filter coil unit for eliminating radio interference from subscribers' dials. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

TELEPHONES

Bulletin No. 111 describing in detail the Masterphone for common battery manual service; also circuit plans for wiring extension sets.

Bulletin No. 112 describes the dial type Masterphone; also circuit plans.

Bulletin No. 113 describes the desk and wall type Masterphones for magneto service, wiring plans also included.

Bulletin No. 101 describes the standard Kellogg desk and wall type instruments for common battery service and gives wiring plans.

Bulletin No. 102 gives wiring plans and complete information about the standard Kellogg desk and wall type telephones for dial systems.

Bulletin No. 103 is about the Kellogg desk and wall type instruments for magneto service. **Kellogg Switchboard & Supply Co., Chicago, Ill.**

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Telephony

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Condensed Telephone News

Companies Are Urgently Requested to Forward to Us Promptly News Concerning Construction, Rebuilding, Financing, Election of Officers, Sales and Purchases of Exchanges or Other Activities

Financial.

DOVER, DEL.—The Gulf States Telephone Co., of Tyler, Texas, is increasing its capital stock from $250,000 to $311,100.

Franchises.

LANE, S. D.—At a recent election the Central West Public Service Co. was granted a 20-year telephone franchise. The company plans to purchase new quarters for the telephone office here.

Construction.

ROSEVILLE, ILL.—The Illinois Valley Telephone Co. has begun erection of a new exchange here and expects to have it ready for occupancy by September 10. It will be a one-story building, with tan-faced brick exterior. Modern type switchboard and new equipment, bringing the service facilities up to latest methods, will be installed. The exchange will probably be in operation by the latter part of October.

MOUNT AIRY, N. C.—It is reported that the Southeast Public Service Co., which recently acquired the local telephone system, plans extending its line from here to Dobson and Elkin.

ARNETT, OKLA.—Cable and other material have been unloaded at Shattuck to be used in the reconstruction of the Arnett telephone system, according to announcement of Jim Keffer, district manager of the Southwestern Associated Telephone Co. Work is to begin immediately.

The company will erect its own building in Arnett, change the main street lines to the alleys and replace the present open wire system with new cable. A new modern switchboard will be installed.

Miscellaneous.

INDIANAPOLIS, IND. — Miss Elizabeth Dunn, local telephone operator of the Indiana Bell Telephone Co. and the company's premier woman golfer, on July 24 won the Indiana women's golf championship, winning in the final round on the 18th green. Previously she had won the city championship. She plays one of the municipal courses and is said to have never had a golf lesson.

INDIANAPOLIS, IND.—Russel C. Rottger, vice-president of the Indiana Bell Telephone Co., has been appointed a major of the quartermaster corps of the 38th National Guard division and is attached to the staff of Major General Robert H. Tyndall. Mr. Rottger left August 1 for Camp Knox for his first camp.

VALPARAISO, IND.—This city will become the headquarters of the Indiana district business of the United Telephone & Electric Co., it was learned August 3 following a visit here of A. J. Roberts, vice-president and general manager of the company. The company recently bought the Goodrich interests in Indiana.

HAMMONDSPORT, N. Y.—The East Side telephone line, connecting cottages along Lake Keuka and owned by T. Spencer Bailey of this place, was recently purchased by George W. Fay, Homer Sands and R. H. Howell, of Hammondsport. They have now sold this line to Wayne Telephone Co., which is at present repairing the line and putting it in first class condition. The central office will be here.

BRYAN, OHIO.—The Bryan exchange of the Ohio Associated Telephone Co. is doing the work of a number of exchanges in this vicinity as far as bookkeeping and toll charges are concerned. The exchanges for which this work is being done are the Edon, Evansport, Farmer, Montpelier, Ney, Pioneer and West Unity exchanges. In addition this office is checking long distance calls in Fayette, Kunkle, Wauseon, Archbold and Stryker exchanges.

CIRCLEVILLE, OHIO.—The Citizens Telephone Co. has mailed out refund checks to its subscribers in the city and on rural lines in accordance with a recent ruling of the Ohio Public Utilities Commission. The commission failed to approve the advanced rates charged by the company for the past two years, which were collected under the Pence law repealed at the last session of the Ohio general assembly.

The first lot of checks covered all subscribers having numbers up to 1000. The remainder will be mailed out this month, it is announced. The subscribers are located in Circleville, Williamsport, Ashville and Laurelville as well as in all rural lines in Puckaway and a part of Fairfield county.

KIPTON, OHIO.—Operation of the Kipton exchange was recently discontinued by the Northern Ohio Telephone Co. and its 85 subscribers at that point connected to its Oberlin exchange, six miles distant, by means of rural common battery, harmonic ringing party lines. Early this year the Bradner exchange of the Northern Ohio company was likewise connected by cable to the Wayne exchange.

LOCK HAVEN, PA.—The Cumberland Valley Telephone Co. has purchased the controlling interest in the Nittany Telephone Co. and the Bald Eagle Telephone Co. For the present, J. Frank McCormick, of Lock Haven, will have charge of both companies.

Much of the stock of these companies was held by Bellefonte and Nittany residents. Nittany stockholders were reported to have received $8.50 per share for their stock and Bald Eagle stockholders $2.50 per share.

BIG BEND, WIS.—Purchase of the Prospect, Guthrie & Big Bend Telephone Co. has been completed by Harry Brooks, of Clintonville, who has assumed management of the company.

The sale was agreed to by a majority of the stockholders, according to Charles Rose of Big Bend, one of the directors. W. C. Henze was treasurer of the old company.

LA CROSSE, WIS.—On Saturday, July 25, at 11:00 p. m. occurred the final act of transferring the long distance operators in the telephone building to the new building, attended with more or less ceremonies on the part of the employes. The actual switching which had been prepared in advance, was done in one minute so that no delays occurred to any long distance calls.

The construction of the building commenced in July, 1930, and was leased to the Wisconsin Telephone company on January 1, 1931, to house long distance telephone repeater equipment. The newly-installed equipment is now being formally accepted and put into service and includes 60 various physical circuits and 15 carrier wave circuits.

Operators of the La Crosse Telephone Corp. operate the toll board on the second floor.

A WELL-BUILT Battery must be physically insulated—proof against the entry of air or moisture—proof against the exit of chemical contents.

Seamless zinc walls and a perfectly sealed top are essential. Both are found in Storm King Duro Powr Telephone Batteries, and found *only* in these Batteries.

Tight roof—tight walls, and all the original energy of the cell stays in until it is actually used in the circuit. There are no other losses, no deterioration by age, no debility in idleness, no Batteries that are half dead when they go in the box.

Age hits harder than use and Storm King Duro Powr Batteries are age-proof. The four-year test proves it. Lengthen the life line and shorten the expense for replacements.

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Gas Heated Soldering Iron Gives Increased Efficiency.

Increased efficiency and greater economy are two of the outstanding advantages claimed for the new "Torchiron" gas-heated soldering iron recently introduced by the Reliance Specialties Mfg. Co., of 122 East 42nd street, New York. Using the Torchiron, the operator has a continuously heated soldering iron for steady work, it is asserted.

Low gas consumption is assured, according to the Reliance company. With the three lb. head, the fuel required is only four or five cu. ft. of gas per hour, and with the five lb. head, five or six cu. ft. of gas per hour.

This iron is heated by either natural or artificial gas and low pressure air mixed by means of a needle valve. Since the gas passes through a flexible hose to the handle of the torch, the iron is very easy to operate.

Constant temperatures are increased or decreased at the option of the operator by regulation of the needle valve. The copper heads may be brought to a red heat within three to five minutes after lighting, it is stated. A great deal of the filing and cleaning, dipping and retinning of the coppers is eliminated, inasmuch as the copper heads are not exposed to the open flame.

Coppers are available in sizes ranging from ½ lb. to five lbs. They also are

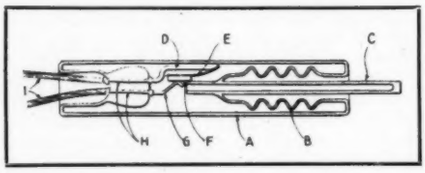
The New Torchiron Gas-Heated Soldering Iron for Steady Work.

made to specifications. The coppers are quickly interchangeable, being screwed onto the stainless steel tip. As the name implies, the Torchiron may be used as a torch as well as an iron, merely by removing the copper head.

Novel Vacuum Contact for Controlling Electrical Currents.

A new and improved device in the form of a vacuum contact has recently been placed on the market. It is for use wherever a positive rapid and durable electrical contact is needed in circuits handling up to six amperes continuous load or eight amperes intermittenly, at potentials up to 220 volts. It can be operated by hand, by mechanical means, or again by an electromagnetic agency in conjunction with the usual telephone type relay.

This contact, it is stated, is especially well adapted for use in telegraph and telephone circuits, for railway switches and



Principle of the Burgess Vacuum Contact.

signals, for fire and burglar alarm systems, controller, advertising signs, rectifiers, electric ranges and other applications. It operates in any position and is unaffected by movement or shaking.

The accompanying diagram presents the operating details of this device, which is known as the Burgess vacuum contact. It will be noted that the principle is extremely simple. It makes use of the elastic property of glass to cause the mechanical actuation of contacts sealed in vacuum.

The bellows, *B*, because of their shape and the tempering of the glass, are highly elastic. A slight movement of the stem or protruding rod, *C*, is communicated to the movable contact block, *E*, causing it to separate from contact block, *G*, which is stationary. The spring, *E*, makes positive contact between the contacts when no pressure is applied to the stem. The contacts are maintained in the evacuated glass tube, *A*. The leads are indicated at *I*.

The vacumm contact is a development of Siemens & Halske of Germany and has met with wide application in that country as well as in Great Britain. It is now being introduced in the United States for the first time by the Burgess Battery Co. of New York and Chicago.

Operating in a vacuum, the vacuum contact is said to be free from serious arcing and corroded contacts. It can handle its rated current as fast as 40 breaks per second. The make and break are positive and clean, without hang-overs and chattering, as proved by comparative oscillograph recordings.

The vacuum contact requires a movement of only 0.02 inch at the end of its stem, which can be brought about by a force of less than 10 ounces, and usually but 6 ounces. The temperature rise at the rated current is extremely slight. The circuit is broken without arcing at less than 0.001 inch separation of the contact blocks. One of these contacts, it is stated, has been operated, at a rate of 10 times per second, 124,000,000 times, without breakdown.

The normal action of the vacuum contact is with contact blocks in positive contact. A slight pressure on the stem breaks the circuit. However, this action can be reversed by mounting the contact with a pressure on the stem normally to break the circuit. Releasing the pressure will cause the circuit to close. Either method of control is practical.

The ideal method of operating the vacuum contact, the manufacturer states, is by means of a single electromagnet relay or telephone type relay, the armature of which is coupled to the end of the vacuum contact stem. The vacuum contact is clamped to the relay by suitable means.

With the early availability of an entirely new form of light-sensitive cell, the vacuum contact promises to play an important role in the light control of many electrical circuits. Is is expected that the ingenuity of engineers in various fields will find entirely new and unexpected applications for this device. It is believed that telephone and telegraph engineers will be interested in the device as it offers opportunities, it is thought, almost comparable to those of the vacuum tube amplifier;

The Burgess Vacuum Contact Which Makes Possible the Control of a Strong Electric Current by Means of a Very Small Current.

that is, it makes possible the control of a considerable amount of energy by an exceedingly delicate controlling current.

Further information regarding the vacuum contact may be obtained from the Burgess Battery Co., 295 Madison Ave., New York.

Conversation Recorder of Magnetic Steel Wire Type.

The International Telephone & Telegraph Corp., through subsidiary companies, will begin shortly the exploitation of a telephone conversation recorder. By means of this device what is said by both parties is recorded on a magnetic steel wire in a manner such that the message can be reproduced at any later time. It is pos-

sible also to obliterate the message so that the wire can be used over again.

The recording device takes up a space about equal to that of a radio broadcast receiver. It is based upon the telegraphone invented 30 years ago by Valdemar Poulsen, a Danish engineer, who also devised an early system for continuous wave wireless telegraphy and helped to make radiotelephony a success. It can record a conversation of 15 minutes' duration.

Its operation is based upon the principle that a steel wire can be made to retain degrees of magnetism varying throughout its length. The telegraphone was invented before the modern three-element vacuum tube, and it is understood to have been through the use of the latter that the recording device was perfected by Dr. Curt Stille of Berlin.

The fluctuating currents in the telephone circuit are amplified in the device and passed through the coils of an electromagnet. The steel wire is drawn across the poles of the latter by an electric motor. The fluctuations, corresponding with the voice vibrations, thus are recorded in the steel in minute and invisible variations of magnetism.

When the conversation is ended, the wire again is drawn through a solenoid, the magnetism acting upon the latter's coils so as to produce a minute current in them. This, in turn, is amplified and the result is the reproduction of the conversation.

According to H. H. Kohlhaas, manager of publications of the I. T. & T. Corp., the record may be kept "virtually indefinitely," but it is thought that in most cases a permanent record would not be needed. To permit repeated use of the same piece of wire, the device incorporates a means for demagnetizing the wire by subjecting it to alternating current, after which it can be used over again. The instrument is attachable to any modern telephone.

No samples of the new device had been imported from Germany, Mr. Kohlhaas said, and whether it would be manufactured in this country had not been determined.

One of the important applications of the conversation recorder is in connection with long distance cable and radio telephone calls.

Burwell, Neb., to Have American Electric Switchboard.

When the new exchange building which is being constructed by the Nebraska Continental Telephone Co., at Burwell, Neb., is completed, new central office equipment will be installed.

The new apparatus includes a two-position monotype community switchboard and power board. The switching unit will have a capacity of 520 lines and will be equipped with 260 local common battery line circuits and 30 drop and jacks for the magneto rural and toll lines. All cord circuits are to be full universal.

In addition to the switchboard, the American Electric Co., Inc., will also furnish the necessary protective equipment. Installation of the new appartus is scheduled to take place during the latter part of this month.

Kind of Wood	Full Pressure Treatment (Number)	Butt Treatment Only (Number)	Total 1930 (Number)	Total 1929 (Number)
Southern pine	2,428,001	172*	2,428,173	2,006,500
Cedar:				
Western red	11,073	1,114,422	1,125,495	1,361,227
Northern white	28	425,026	425,054	650,424
Chestnut	.....	188,958	188,958	294,904
Lodgepole pine	8,983	87,374	96,357	.....
Douglas fir	10,719	1,209	11,928	.....
Miscellaneous	.....	66	66	.....
Total	2,458,804	1,817,227	4,276,031	.....

*Experimental treatment.

Table Showing Poles Treated in 1930 by Kinds of Wood and Kinds of Treatment.

Treated Pine Poles Show Increase in 1930 Over 1929.

The 1930 statistics for poles treated have been given out by the government. They show an increase over 1929 of 21 per cent in pine poles treated. In a year of decreasing markets treated pine made its greatest stride forward.

The accompanying table gives the detailed figures.

Prices in the Metal Markets.

New York, August 3: Copper—quiet; electrolytic spot and future, 7⅝@8c. Tin—steady; spot and nearby, $24.50; future, $24.62. Iron—steady; No. 2 f. o. b. eastern Pennsylvania, $15.50@16.50; Buffalo, $15.00 @16.00; Alabama, $11.00@13.00. Lead—Steady; spot New York, 4.40c; East St. Louis, 4.22c. Zinc—quiet; East St. Louis spot and future, 3.85@3.87c.

Stromberg-Carlson Paging System for Medical College.

A complete paging system has been purchased from the Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., by the Sanborn Electric Co., of Indianapolis, Ind., for installation in the Meharry Medical College located at Nashville, Tenn.

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WHAT THE COURTS AND COMMISSIONS ARE DOING.

(*Continued from page* 31.)

Rushville Telephone Corp. to issue $360,000 of its common stock in exchange for the property and for a certificate of convenience and necessity to the Rushville corporation in respect to the properties.

MICHIGAN.

July 30: Hearing in Lansing on complaint of the Tri-County Telephone Co. against the Gobleville Farm Telephone Co. The Tri-County company contends that the Gobleville company is not properly incorporated.

MINNESOTA.

August 13: Hearing in the matter of the complaint of Dr. A. J. Button of unsatisfactory telephone service furnished by the Greenbush Telephone Co. and request for night emergency service at the Greenbush exchange. M-2156.

NEBRASKA.

July 28: Application filed by the Garfield County Mutual Telephone Co., of Burwell, for authority to increase business and residence rates within the municipal borders. The company is not asking any change in rural rates.

The petition claimed that the present revenues are insufficient to enable it to properly function and to give adequate service, and that its plans contemplate reconstruction of the town lines so as to give patrons a better grade of service. The company filed a petition signed by most of the town subscribers agreeing to pay the rates asked in consideration of betterments and additions to the property.

NEW YORK.

August 6: Hearing in Albany before Examiner W. T. Wilkinson on petition of the Afton Independent Telephone Co. for permission to transfer its property to the Afton Independent Telephone Co., Inc.

August 6: Hearing in Albany before Examiner W. T. Wilkinson on petition of the Afton Independent Telephone Co., Inc., to construct telephone lines (now mainly constructed) and a certificate that public convenience require such construction and to issue stock.

August 14: Hearing in Syracuse on proposed rates of the Dryden Telephone Corp. applicable to Dryden and Virgil exchanges. Temporary rates fixed by the commission are now in effect.

WISCONSIN.

July 20: Order issued rescinding an order issued February 3, 1930, and directing that service between the Dickeyville and Potosi telephone exchanges should be free but that messages beyond Potosi and beyond centrals with which Dickeyville has free connections must pay a 10-cent toll.

The Dickeyville exchange is owned by the Farmers Mutual Telephone Co. and the Potosi exchange by the Farmers' Telephone Co. of Beetown. The latter company is owned by the former.

July 30: The commission ordered a state-wide investigation into the rates and services of the Wisconsin Telephone Co.; 22 specific requests for data on the American Telephone & Telegraph Co., and other affiliated corporations as well as corporations affiliated with affiliates of the Wisconsin company.

July 30: The commission ruled that a decision on the application of the Wisconsin Telephone Co. for a 25 per cent increase in rates in the city of Madison cannot be made until the completion of the state-wide investigation now under way. The proceeding is to be kept open pending the submission of data requested.

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